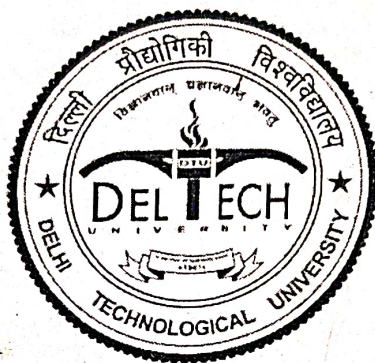# QUESTIONS PAPERS
SUPPLEMENTARY EXAMINATION
FEBRUARY- 2019

B.TECH and B.TECH. (EVENING)
1st, 3rd, 5th & 7th SEMESTER

M.TECH (FT/PT)
1st & 3rd SEMESTER

****

QUESTION PAPERS FOR B. TECH (NEW): SUPPLEMENTARY EXAMINATION
FEBRUARY-2019 (Semester –I/III/V/VII)

S.N.	Name of the Department	Paper Code	SEM-I Page no.	SEM- III Page no.	SEM-V Page no.	VII Page no.
1	Applied Chemistry (AC)	AC/PT/PS	01-02	03-04	05-11	12-13
2	Applied Math.(AM)	MA/MC/CS	14-15	16-26	27-32	33-35
3	Applied Physics((AP)	AP/EP	36-37	38-43	44-48	49
4	Bio Technology (BT)	BT	50-51	52-55	56	----
5	Civil Engineering (CE)	CE	-----	57-62	63-69	70-73
6	Comp. Sc. & Engineering	CO	-----	74-84	85-91	----
7	Comp. Sc. & Engineering	SE	----	92-95	96-99	100
8	DEPTT OF Design	DD	-----	------	----	-----
9	Electrical Engineering. (EE/EL)	EE	101	102	103-104	105-107
10	Electronics & Commu.(ECE)	ECE	----	108-112	113-122	------
11	Environmental Engg (EN)	EN	----	123-129	130-138	139-142
12	FEC	FEC	147-162	143-144	145-146	----
13	Humanities (HU)	HU/MG	----	----	----	----
14	Information Tech.	IT	----	163-165	166-167	----
15	Mechanical (Automobile)	AE	----	168-173	174-176	177
16	Mechanical Engineering	ME	187-188	178-181	182-186	----
17	Mechanical (Production)	PE	-----	189-194	195-199	----
				200-208	209-212	213-214

Tota   of Pages: 02

FIRST SEMESTER

Roll No. ....

B.Tech. [Gp A]

SUPPLEMENTARY EXAMINATION   *February-2019*

AC-101 CHEMISTRY

Time: 3 Hours   Max. Marks: 40

> **Note :** Answer FIVE questions. Question number ONE is compulsory
> Assume suitable missing data, if any.

1   Answer all the following questions   [12]

[a] Draw the structural changes in case of methyl orange under the different pH conditions.

[b] What are the sources of UV-Vis and IR radiations in respective spectrophotometers?

[c] In a polymer, there are 100 molecules of molecular weight 100; 200 molecules of molecular weight 1000; and 300 molecules of molecular weight 10,000. Find $\bar{M}_n$, $\bar{M}_w$ and PDI.

[d] How will you account for the mass increase of a sample with temperature in thermogram?

[e] Write the phase rule equation for two component systems and explain.

[f] Calculate the % atom economy of the following reaction for the preparation of 1-cyclohexane (atomic weight of sulphur is 32);

$$CH_3(CH_2)_4CH_2OH + SOCl_2 \longrightarrow CH_3(CH_2)_4CH_2Cl + SO_2 + HCl$$
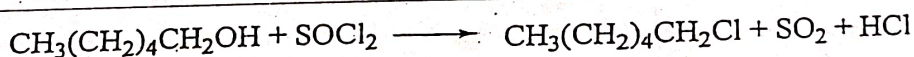
2 [a] Explain the principle of DTA with the help of a suitable thermogram.   [3]

[b] Classify polymers on the basis of stereochemistry.   [4]

3 [a] Write short notes on precipitation titrations.   [3]

[b] Calculate λ_{max} for the following molecules using Woodward – Fiesher rule.

(i)   (ii)   [4]
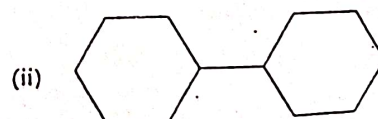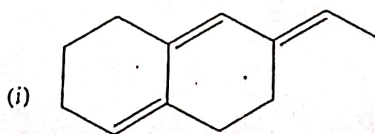
4 [a] Explain the mechanism of free radical polymerization by taking any suitable example. [3]

[b] Write four important characteristics of battery. [4]

5 [a] Draw and explain phase diagram of water. [3]

[b] State and derive Lambert Beer's law. Write its important limitations [4]

6 [a] Calculate the number of components of the following systems (assume water undissociated);

$KCl-NaCl-H_2O$

$KCl-NaBr-H_2O$ [3]

[b] What is electroplating. Describe its principle. [4]

7 [a] Write short notes on Lithium ion batteries. [3]

[b] Write four principles of green chemistry and explain any one in detail. [4]

Total No. of Pages 01   Roll No._____
3th SEMESTER   B.Tech. PSCT
SUPPLIMENTARY EXAMINATION   (Feb-2019)
                    PT 203   Elements of Chemical Engineering
Time: 3:00 Hours   Max. Marks: 40

> **Note:** Answer all questions. Assume any suitable data, if necessary. **Use pencil to draw the Figures.**

1 (a). Draw a neat diagram of Agitation Equipment and label its parts.
   (b). Differentiate between an Ideal Screen and an Actual screen. ----5+5=10

2. The waste acid in a nitrating process contains 11.3% HNO_3, 44.4% H_2SO_4 and 44.3% H_2O by weight. This is to be concentrated to contain 32% HNO_3 and 60% H_2SO_4 by weight by adding concentrated nitric acid containing 92% by weight HNO_3 and concentrated sulphuric acid containing 98% of H_2SO_4 by weight. Calculate the weight of the waste acid and the concentrated acids to be combined to obtain 2000 kg of desired mixture.   10

3(a). Write a note on "Batch Reactors". Draw a neat diagram of Batch Reactor. Write the advantages of batch reactors over the other types of reactors commonly used in Chemical and Process industries.
(b). Write a note on Screen Analysis for particle size distribution.   6+4=10

4 (a). Differentiate between (any 2):
   i.   Unit Operations and Unit Processes
   ii.   Limiting Reactant and Excess Reactant
   iii. Propeller and Turbine
(b). A single effect evaporator is fed with 10000 kg/h of weak liquor containing 15% caustic (NaOH) by weight and is concentrated to get thick liquor containing 40% by weight caustic. Calculate: (i). kg/h of water evaporated (ii). kg/h of thick liquor obtained.   5+5=10

Total No. of Pages 1

Roll no..............

~~FIRST~~ SEMESTER (supplimentry)

B.Tech. [PT]

END SEMESTER EXAMINATION

Feb-2019

PT 207 Engineering analysis and design

Max. Marks : 40

Time: 3:00 Hours

Note : All questions carry equal marks.
Assume suitable missing data, if any.

1. (a) Explain Light Scattering Method in detail to determine the molecular weight of the given polymer.
   (b) What is End group analysis? Explain.

2. (a) Explain the principle of Mass Spectroscopy in detail.
   (b) State and discuss the expected IR spectrum of PVA and PAA.

3. (a) Explain in detail X-ray diffraction method to determine the crystallinity of the polymer.
   (b) Explain crystallization kinetics in detail.

4. (a) Draw and explain typical stress-strain curve and show how to calculate flexural modulus ?
   (b) What is mean by isochronous curve? Explain in detail.

5. (a) Discuss the factors affecting the peak position of λ_{max} in UV-visible spectrum.
   (b) Draw the diagram illustrating creep and cold flow and explain in detail with an example.

END

Total No. of Pages 01

5th SEMESTER
SUPPLIMENTARY EXAMINATION
PT 301   **Heat Transfer**

Roll No._____

B.Tech. PSCT
(Feb-2019)

Max. Marks: 40

Time: 3:00 Hours

Note: Answer all questions. Assume any suitable data, if necessary

1 (a). Derive an expression for Unsteady State Conduction.
  (b). Write the expressions for Dittus Boelter and Sieder-Tate Equation for convective heat transfer.   8+2=10

2 (a). Why the thermal conductivity of the material in damp state is higher as compared to that in dry state? Give suitable reasons.
  (b). Explain with suitable diagram working and construction of forced circulation evaporator? Also list out its advantages and disadvantages.   2+8=10

3 (a). A hollow sphere has an inside surface temperature 300^0C and outside surface temperature of 30^0 C. Calculate the heat loss by conduction for an inside diameter of 5 cm and outside diameter of 15cm, given that the thermal conductivity of the material is 15kcal/hr.m^{0}C.

  (b). What is condensation? Differentiate between Film-wise and Drop-wise Condensation.

  (c). What is boiling? Discuss the types of boiling.   [3+5+2=10]

4(a). Water enters a two-fluid heat exchanger at 55^0 C and leaves at 85^0C. Hot gases enter at 305^0C and leaves at 160^0C. If the total heat transfer area is 500 m^2 and the overall heat transfer co-efficient is 600kcal/hr m^{0}C, determine the total heat transfer per hour for: (1) Parallel flow, and (2) Counter flow of the two fluids.
  (b). Write a note on the following (with suitable diagrams)(any one)
  - Fluidized Heat Exchanger
  - LMTD Correction Factor
  - 2-4 pass shell and tube heat exchanger.   [5+5=10]

END

Total No. of Pages 2
Roll No...............

PT-303 **Polymer Processing Techniques**

Supplementary examination February-2019

Time: 3Hours *Max.Marks: 40*

> **Note:** Attempt any **FIVE** questions.
> Assume suitable missing data, if any.

1. Write brief answers/reasons to the following:
    a) Define injection moulding of a plastic material. [1]
    b) The basic blow moulding process is built upon
       i) compression, ii) extrusion, iii) drawing, iv) spinning. [1]
    c) What is foamed polyurethane systems? [1]
    d) What are different types of screw zones in an machine.? [1]
    e) Write any three advantages of gas assist injection moulding. [1]
    f) What is blow moulding parison sag? [1]
    g) What are the advantages of structure foam moulding? [1]
    h) How can shrinkage be represented? [1]

2. a) Describe the various types of heaters for heating a barrel. [4]
    b) Advantages and disadvantages of RIM process. [2]

    c) Write the full form of
       i. RRIM
       ii. SMC
       iii. RMT
       iv. UHMWPE [2]

3. a) Discuss the two processes generally used for blow moulding. [4]
    b) Compare the two types of injection moulding machine,
       i. Plunger injection moulding,
       ii. Reciprocating injection moulding [4]

P.T.O.

4. **a)** Draw a pressure circuit diagram having electric motor coupled to hydraulic pump, pressure gauge and throttle valve [2]

i. What is the pressure gauge reading when throttle valve is fully opened? [1]

ii. What happens when the throttle valve is being closed to fully closed position? [1]

b) It is required to enhance the shelf life of food products. What properties are to be taken into consideration while designing the container? [4]

5. **a)** Describe the four basic steps of rotational moulding process. [4]

b) Discuss the role of nature of substrate and interface in the performance of coating. [4]

6. **a)** Describe the processing steps involved in the compression moulding. [4]

b) Describe the types of compression moulds
  i. Flash mould
  ii. Fully Positive moulds [4]

7.a) What is structural foam moulding? With the help of sequential diagrams explain the three phases of co injection moulding. [4]

b) Discuss the following components of the blow moulding machine [4]

    i the extruder

    ii parison head

    iii accumulater system

    iv venting and surface finish

END

Total No. of Pages: 02

Roll No. ... .

B.Tech.[PSCT]

Fifth Semester

SUPPLEMENTARY EXAMINATION

(Feb.-2019)

(PT 307) Optimization Techniques

Time: 3Hours

Max. Marks: 50

Note:	Attempt any five questions
	Assume suitable missing data, if any
	All questions carry equal marks

Q.1 (a) Write about the essential features of an optimization problem.

(5)

(b) Write the different types of classification of optimization problems.

(5)

Q.2 (a) Write the necessary and sufficient conditions for single variable optimization problem.

(3)

(b) Find the minimum point for following function between $x = 2$; and $x = 4$ by using Interval Halving Method

$$f(x) = x^2 + \frac{54}{x}$$

(7)

Q.3 (a) Write the algorithm of Golden Section Search Method. (5)

(b) Write the algorithm of Simplex Downhill method for unconstrained optimization.

(5)

Q.4 (a) What are you understand by a constrained optimization problem? Explain with an example?

(5)

(b) Minimize the following function using Inverse Internal Penalty function Method (Using analytical approach)

P.T.O.

$$f(x) = x$$

Subjected to $5 - x \leq 0$

(5)

Q.5 (a) Minimize the following function using Kuhn-Tucker Conditions

$$f(x_1, x_2) = x_1^2 + x_2^2 + 60x_1$$

Subjected to $g_1 = x_1 - 80 \geq 0$ and $g_2 = x_1 + x_2 - 120 \geq 0$ (7)

(b) Explain the Lagrangian method to minimize the constrained optimization problem by using.

(3)

Q.6 (a) Explain a bracketing method for single variable optimization.

(5)

(b) What are you understand by multi-objective optimization explain with an example.

(5)

END

B.E.(PSCT) End Term Examination 2019
PT 315- Packaging Technology

Time: 3H

Max. Marks: 50

Note: Attempt any five questions. All questions carry equal marks.
Assume data for missing parts, if any.

1 (a). Write down different definitions of packaging. Describe characteristics of a good packaging material.

(b). What are the main functions of packaging? Describe protective functions in detail.

2 (a). Which polymer films are used in flexible packaging? Describe main characteristics of flexible packaging.

(b). What do you understand by permeability of packaging films? Define WVTR and OTR.

3 (a). Enlist the ancillary materials used for packaging. Give a detailed account of caps and closures used in packaging.

(b). Write a note on (i). Adhesives and (ii). Sealing systems

4 (a). What do you understand by modified atmosphere packaging?

(b). Describe aseptic packaging. What are the methods of sterilization of packaging?

5 (a). Describe PFA, FPO, MFPO and Agmark rule.

(b). Describe one method to determine water vapour transmission rate (WVTR) of a packaging film.

6 (a). What are the advantages and disadvantages of paper packaging?

(b). Describe grammage and basis weight of packaging. What is the ratio of thickness of paper packaging of 80 gsm and 125 gsm? Assume thickness as t1 and t2 respectively.

B.E.(PSCT) End Term Examination 2019
PT 315- Packaging Technology

Time: 3H

Max. Marks: 50

Note: **Attempt any five questions. All questions carry equal marks.**
Assume data for missing parts, if any.

1 (a). Write down different definitions of packaging. Describe characteristics of a good packaging material.

(b). What are the main functions of packaging? Describe protective functions in detail.

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6 (a). What are the advantages and disadvantages of paper packaging?

(b). Describe grammage and basis weight of packaging. What is the ratio of thickness of paper packaging of 80 gsm and 125 gsm? Assume thickness as t1 and t2 respectively.

7 (a). Which metals are used in the packaging? What are advantag
metal packaging?

(b). Describe the methods of making a two piece metal can.

8 (a). Describe the methods of making glass container for packagir

(b). Discuss the advantages of biodegradable packaging. Name an
materials which are biodegradable and also used in packaging.

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Roll ....

FIFTH SEMESTER
SUPPLEMENTARY EXAMINATION

B.Tech.[EC].
Feb-2019

Subject: Non-Conventional Energy (PT-365)

Time: 3:00 Hours

Max. Marks: 50

Note: Answer all questions. Assume suitable missing data, if any.

1. Enlist the different non-conventional energy systems? What are the prospects of non-conventional energy in India. [5]

2. What are the advantages and limitations of renewable energy resources? Write a note on energy crisis in India. [5]

3. Explain in brief the different methods of hydrogen storage. Describe how hydrogen can be used as an alternative fuel for motor vehicles. [5]

4. Discuss the factors affecting biogas generation. Discuss the popular biogas plants developed in India. What are various problems and constraints for biogas development? [5]

5. What is the need for alternate energy sources? Explain by considering solar energy. [5]

Or

What is geothermal energy? List its merits and demerits, applications and environmental impact. [5]

6. Explain the principle of Wind Energy Conversion. What are the basic components of wind energy conversion system? Explain with a neat diagram. [5]

Or

Discuss, in detail, the comparative cost considerations and economics of the following non-conventional energy sources: Solar, biogas, wind, tidal and geothermal. [5]

7. What are the advantages and limitations of renewable energy resources? Write a note on energy crisis in India. [5]

Or

Sketch and explain single basin type tidal power plant operation. [5]

8. Discuss the prospects and status of wind energy in India. [5]

9. List three major advantages and three major disadvantages of fuel cells compared to other power conversion devices. Discuss at least two potential applications where the unique attributes of fuel cells make them attractive? [5]

Or

Explain the Hall Effect in magneto hydro dynamic (MHD) generator and methods adopted to overcome the limitations. [5]

10. In general, do you think a portable fuel cell would be better for an application requiring low power but high capacity (long run time) or high power but small capacity (short run time)? Explain. [5]

Or

Explain the principle of ocean thermal energy conversion (OTEC). With a simple layout, explain the working of a closed cycle OTEC plant. [5]

Total No. of Pages: 02

Roll No. ... .

Seventh *Semester*

B. Tech. (PT)

End Semester Supplementary Examination

(Feb.-2019)

PT407 Chemical Process Technology

Time: **3hr**

Max. Marks: 40

NOTE: Answer Any FIVE questions.
Assume suitable missing data if any.

1. (a) Draw the schematic representations of the following Unit Operations:

   i] Continuous Fractionator   ii] Centrifugal Pump

   iii] Screw Conveyer.   3

   (b) Write the chemical reactions involved during hydrogenation of oils.   2

   (c) Which additives are used as Detergent builders to improve the performance?   2

2. (a) Write the uses of following:

   i] Spray drier   ii] Wet scrubber   2

   (b) Comment on current scenario of Sugar industry in India.   5

3. (a) Define Sweet water. What are its end uses?   3

   (b) What is the problem in storage of Sugar Canes?   2

   (c) Write the raw materials sources for sulphuric acid manufacture.   2

4. (a) Discuss major engineering problems encountered in Electrolytic process for sodium hydroxide and chlorine production.   5

   (b) Comment on the by-product recovery from the pulp industry.   2

5. (a) Explain the Paper manufacturing process with the help of neat flow diagram.   6

P.T.O.

(b) What are the major oil seeds produced in India?

6. (a) List the difficulties faced by paper industry in India.

(b) Calculate the weights of raw materials required (in tons) f manufacturing 1000 tons of Superphosphate fertilizer per day.

(c) Write the uses of bagasse in sugar industry.

END

Ist Semester   END SEMESTER EXAMINATION   B.Tech.

PAPER CODE - MA 101   Supplementary-~~Odd~~ ~~Nov./Dec. 2018~~ Feb. 201

TITLE OF PAPER - Mathematics-1

TIME: 03 HRS   MAX. MARKS: 50

Note: Attempt any FIVE questions. Each question carry equal marks.

Assume suitable missing data, if any.

1. (a) Discuss the convergence and divergence of the following   (5)

     (i) $\sum_{n=1}^{\infty} \dfrac{5^n}{4^n + 3}$ (ii) $\sum_{n=1}^{\infty} n e^{-n^2}$.

   (b) Find the radius and interval of convergence for $\sum_{n=0}^{\infty} \dfrac{(x - \sqrt{2})^{2n+1}}{2^n}$.   (5)

     For what values of x does the series converges (a) absolutely, (b) conditionally?

2. (a) Find the radius of curvature at the point $(3a/2, 3a/2)$ of the (5)

     Folium $x^3 + y^3 = 3axy$.

   (b) Find the length of the curve $y = (x/2)^{2/3}$ from $x = 0$ to $x = 2$.   (5)

3. (a) If $w = f(x, y)$ where $x = r \cos\theta$ and $y = r \sin\theta$ show that   (5)

$$\left(\frac{\partial w}{\partial r}\right)^2 + \frac{1}{r^2}\left(\frac{\partial w}{\partial \theta}\right)^2 = \left(\frac{\partial f}{\partial x}\right)^2 + \left(\frac{\partial f}{\partial y}\right)^2.$$

   (b) Find the point $P(x, y, z)$ closest to the origin on the plane   (5)

     $2x + y - z - 5 = 0$.

P-T.O.

4. (a) Evaluate $\int_0^2 \int_0^{\sqrt{1-(x-1)^2}} \dfrac{x+y}{x^2+y^2} dy\, dx.$ (5)

(b) Find the average value of $F(x, y, z) = xyz$ over the cube bounded (5) by the coordinate planes and the planes $x = 2$, $y = 2$, and $z = 2$ in the first octant.

5. (a) Suppose that the height of a hill above sea level is given by (5) $z = 1000 - 0.01x^2 - 0.02y^2$. If you are at the point $(60, 100)$ in what direction is the elevation changing fastest? What is the maximum rate of change of the elevation at this point?

(b) Define gradient, divergence and curl. Hence, discuss their phys- (5) ical significance.

6. (a) Evaluate the line integral $\int_c (x-y)\, dx + (x+y)\, dy$ counterclock- (5) wise around the triangle with vertices $(0,0)$, $(1,0)$, and $(0,1)$.

(b) Verify Green's theorem for $\int_c (xy + y^2)\, dx + x^2\, dy$ where C is (5) the region bounded by $y = x$ and $y = x^2$.

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2

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3rd Semester

B.Tech. [MC]

Supplementary End Term Examination

Feb 2019
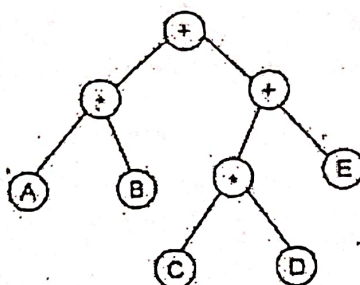
CS-251 Data Structure

Time: 3hours

Max Marks: 40

NOTE: *Attempt any five (5) Questions. Assume suitable missing data, if any.*

Q1. (a) A two-dimensional array TABLE [6] [8] is stored in row major order with base address 351. What is the address of TABLE [3] [4]? [2]

(b) Determine the Inorder, Pre order and Post order traversal of the given tree: [3]

(c) Determine how to implement Queue using two stacks? [3]

Q2. (a) Consider the following infix expression and convert it into reverse polish notation using stack: (A + (B * C − (D / E ^ F) * G) * H). [3]

^ is the exponential operator

(b) Compare the complexities in average and worst case of the following sorting:

Merge sort, Heap sort, Quick sort, Bubble sort [5]

Q3. (a) Write an algorithm to find, count, and remove duplicate elements in a queue. Give some applications of queue. [4]

(b) Explain with an example, what is a linked list? Write an algorithm/ program for inserting and deleting a node at a given location in circular linked list. [4]

Q4. (a) Draw a tree with the following information: [5]
   Preorder: G, B, Q, A, C, K, F, P, D, E, R, H
   Inorder: Q, B, K, C, F, A, G, P, E, D, H, R
   Also find the post order of the tree.

(b) Write an algorithm/program for Insertion operation on queue using Singly Linked List [3]

Q5. (a) Compare Binary Tree, Complete Binary Tree, Binary Search Tree and B-tree with the help of an example. [5]

P.T.O

(b) Which are the two standard ways of traversing a graph? Explain with the help of an example. [3]

Q6. (a) What is a Graph? Explain matrix and linked list representation of a graph. Also state the applications of graph. [4]

(b) What is AVLtree? Explain with the help of a suitable example. [4]

Q7. (a) Draw the 11-item hash table resulting from hashing the keys: 12, 44, 13, 88, 23, 94, 11, 39, 20, 16, and 5 using the hash function: h(i) = (2i+5) mod 11. [3]

(b) What do you mean by Minimum Spanning Tree? Generate Minimum Spanning Tree using Kruskal's algorithm for the following graph: [5]
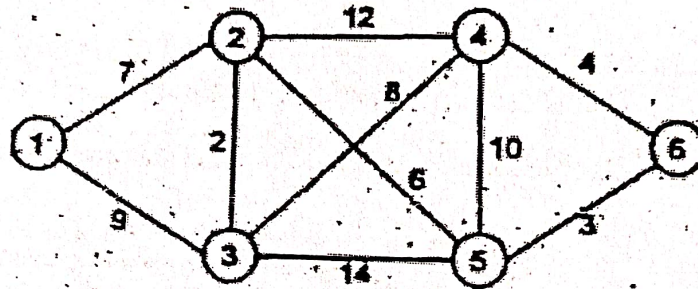
Q8. Write a short note on:
(a) Circular Queue [8]
(b) Hashing and Hash function
(c) Heap sort
(d) Threaded Binary Tree

END

Roll no._____

BIOTECH III SEMESTER

SUPPLEMENTARY EXAMINATION 2019

Paper Code: MA251 /MC251 (Applied Mathematics)

Time: 3 Hrs.   max marks: 50

NOTE: All the questions are compulsory. All questions carry equal marks.

Q1. What are quartiles? Find all the quartiles for the data given below:

Class interval	80-120	120-160	160-200	200-240	240-280	280-320	320-360	360-400
Frequency	10	140	390	265	98	35	14	05

Q2. Three technicians X, Y and Z service respectively 30%, 40% and 30% breakdowns when occur on an automated production line. The technician X makes an incomplete repair 1 time in 15, Y makes an incomplete repair 1 time in 10 and Z makes an incomplete repair 1 time in 20. For the next breakdown a repair made was found to be incomplete, find the probability that this repair was made by Y.

Q 3. If the average number of claims handled daily by an insurance company is 5, what proportion of days has less than 3 claims? What is the probability that there will be 4 claims in exactly 3 of the next 5 days? Assume that the number of claims on different days is independent.

Q 4. Define normal distribution and all its properties.

Q5. If the lifetime of a certain kind of automobile battery is normally distributed with a mean of 4 years and a standard deviation of 1 year, and the manufacturer wishes to guarantee the battery for 3 years, what percentage of the batteries will he have to replace under the guarantee?

Q6. Equation $f(x) = x^3 + 3x^2 + 4x - 1 = 0$ has a root near $x = 1/2$. Find a suitable function $g(x)$ to approximate the root using general iteration method $x_{n+1} = g(x_n)$. Also, calculate the root correct up to three places of decimal.

Q7. Define rate of convergence of an iterative method and find the rate of convergence of Newton Raphson method.

Q8. Use Secant method to approximate of the smallest positive real root correct up to three decimal places of the equation: $x^4 - x - 9 = 0$.

Q9. Apply Crout's method to solve the following linear system

$$2x_1 + x_2 + x_3 = 4$$

$$x_1 + 2x_2 + 2x_3 = 5$$

$$x_1 + 2x_2 + 9x_3 = 12$$

Q10. Use Gauss-Seidel method to solve the following system with initial guess as

$$x_1^{(0)} = 1, \ x_2^{(0)} = 1, \ x_3^{(0)} = 1.$$

$$5x_1 + 3x_2 - x_3 = 15, \quad -2x_2 + 4x_2 + x_3 = 12, \quad x_1 + 2x_2 + 6x_3 = 32.$$

——————————The End——————————

No. of pages:2

Supplementary Examination
III Semester, February 2019
Discrete Mathematics
(MC-201) (NEW SCHEME)

Time: 3.00 Hours

Max Marks: 50

Note:

- Attempt all Questions and do any two parts out of the three in each Question.

- All Questions carry equal marks.

- Assume suitable missing data if any.

Q 1. (a) Let $A_1, A_2, \cdots, A_n$ be any n sets. Show by mathematical induction that

$$\overline{\left(\bigcup_{i=1}^{n} A_i\right)} = \bigcap_{i=1}^{n} \overline{A_i}$$

(b) Write short note on
   i. Bipartite Graph
   ii. Euler Graph

(c) i. Give a direct proof of "If 'm' and 'n' are odd integers, then mn is an odd integer".
   ii. Prove or disprove that the union of two subgroups of a group G is a subgroup if and only if one is contained in the other.

Q 2. (a) Rewrite the following argument using quantifiers. Prove the validity also:
   i. If a number is odd then its square is odd. K is a particular number that is odd. Therefore K^2 is odd.
   ii. All healthy people eat an apple a day. You do not eat apple a day. You are not a healthy person.

(b) Show that (by using rule of Inference) the hypothesis "If you send me e-mail message, then I will finish writing the program," "If you do not send me an e-mail message, then I will go to sleep early," and "If I go to sleep early, then I will wake up feeling refreshed" lead to the conclusion "If I do not finish writing the program then I will wake up feeling refreshed".

(c) State and prove the Lagrange's theorem. Also discuss the theorem with a suitable example.

Q 3. (a) For any Lattice L, prove the following:

$$(a \wedge b) \vee (b \wedge c) \vee (c \wedge a) \le (a \vee b) \wedge (b \vee c) \wedge (c \vee a)$$

P.T.O.

(b) If in a group G, $x^5 = e$, $xyx^{-1} = y^2$ for $x, y \in G$ then show that $O(y) = 31$.

(c) If R is an equivalence relation on a set X and $|X| = |R|$. What must the relation look like? Explain.

Q 4. (a) Let n be a positive integer, and p^2/n; p is a prime number, then D_n where $D_n = \{x : x|n \; \forall \, x \in N\}$ will not be a boolean algebra.

(b) Let

$$p(x, y, z) = (x \wedge y) \vee (x \vee (x \vee (y' \wedge z)))$$

be a Boolean polynomial. Obtain the truth table for the Boolean function $f : B_3 \to B$ as determined by this Boolean polynomial.

(c)   i. Prove that intersection of two sublattices is a sublattice. What is about union of two sublattices?

  ii. Let $X = \{a, b, c\}$. Define $f : X \to X$ such that $f = \{(a, b), (b, a), (c, c)\}$. Determine (i) f^{-1} (ii) f^2 (iii) f^3 (iv) f^4

Q 5. (a) $D_n = \{x : x|n \; \forall \, x \in N\}$
  Consider $D_{30} = \{1, 2, 3, 5, 6, 10, 15, 30\}$.

  i. Find all the lower bounds of 10 and 15.

  ii. Determine GLB of 10 and 15.

  iii. Find all the upper bounds of 10 and 15.

  iv. Determine LUB of 10 and 15.

  v. Find greatest element of D_{30}.

  vi. Find least element of D_{30}.

(b) Prove that "An undirected graph is a tree if and only if there is a unique simple path between any two of its vertices".

(c) Solve the recurrence relation

$$a_n = 5a_{n-1} - 6a_{n-2} + 7^n$$

B.Tech.

III - SEMESTER

END SEMESTER SUPPLEMENTARY EXAMINATION

FEBRUARY-2019

PAPER CODE - MC-203

TITLE OF PAPER-MATHEMATICS-III

Max. Marks : 40

Time: 3:00 Hours

Note : Answer any five questions from the following questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 [a] Discuss the convergence of $\int_0^{\pi/2} \frac{sin^n x}{x^m} dx$

[b] Define Gamma function and discuss its convergence.

Q.2 [a] Obtain range of $\propto$ so that $\int_0^\infty \frac{x^\propto}{x+1} dx$ converges.

[b] Show that B(m , n) =B(m+1, n) +B(M , n+1) .

Q.3 [a] If f(z) = u+iv is an analytic function of complex variable z and u+v = (x -y)(x² +4xy+y²) then find f(z)

[b] Find image of strip $\frac{1}{4} \le y \le \frac{1}{2}$ under the transformation $w = \frac{1}{z}$, and depict the region.

Q.4 [a] What do you mean by conformal transformation; discuss the transformation w = z + 1/z in detail.

[b] Show that v(x,y) =ln(x² +y²) + x -2y is harmonic. Find its conjugate harmonic function. u(x,y) and corresponding f(z).

Q.5 [a] Evaluate $\oint_c \frac{dz}{(z-1)(z-2)(z-3)}$; c:|z| = 4, using Cauchy's integral theorem

[b] Expand $\frac{7z-2}{z(z+1)(z-2)}$ as a Laurent series in 1<|z + 1| < 3.

Q.6 [a] Evaluate the integral $\oint_c \frac{e^z}{(z+2i)^3(z+i)} dz$ c: $|z| = 2.5$.

[b] Evaluate $\int_0^{2\pi} \frac{\cos \theta}{13-12 \cos 2\theta} d\theta$.

Q.7 [a] Find inverse Z-transform of $\frac{1}{z(z-2)^2}$:

[b] Solve $y_{n+2} - 2y_{n+1} + y_n = n$, $y_0 = 1$, $y_1 = 1$, using Z- transform.

Total No. of pages:1

3rd Semester

Supplementary Semester examination

Roll No:_____

B.Tech (MCE)

Feb 2019

MC205 Probability and Statistics

Time: 3hours

Max Marks: 40

Use of probability distribution tables and scientific calculator is allowed.

1. A random sample of 1000 persons from Chennai city have an average height of 67 inches and another random sample of 1200 persons from Mumbai city have an average height of 68 inches. Can the samples be regarded that the average height of persons from both cities is equal with a standard deviation of 5 inches? Test at 2% level of significance. (5)

2. Suppose a basketball player is practicing shooting, and has a probability 0.95 of making each of his shots. Also assume that his shots are independent of one another. Let X be the number of shots made in 100 attempts. What is the probability mass function of X? What is E[X]? Let Y be the number of shots made before the first miss. What is the probability that Y>50? (5)

3. Two factories, A and B, make radios. The radios from factory A are defective with probability 0.1, while those from factory B are defective with probability 0.05. You buy a radio at the store, which is equally likely to have been made at either factory. Suppose the radio you bought turns out to be defective. Given this knowledge, what is the conditional probability it was made in factory B? You go back to the store to buy another radio, but the store owner tells you that all the radios in stock, including the defective one you previously bought, were made at the same factory, although she does not know which factory it is. Given his knowledge, what is the conditional probability that the second radio will also be defective? (6)

4. Suppose that $X_1, X_2, \ldots, X_n, \ldots$ is a sequence of independent identically distributed random variables with mean 1 and variance 1600, and assume that these variables are non-negative: $P(X_i \geq 0) = 1$. Let Y be the sum of the first 100 variables: $Y = \sum_{i=1}^{} X_i$. What does Markov's inequality tell about the probability $P(Y \geq 900)$? Use the central limit theorem to approximate the probability $P(Y \geq 900)$? (6)

5. An electronic scale in an automated filling operation stops the manufacturing line after three underweight packages are detected. Suppose that the probability of an underweight package is 0.001 and each fill is independent. What is the mean number of fills before the line is stopped? What is the standard deviation of the number of fills before the line is stopped? (6)

6. The sales of milk from a milk booth are varying from day-to-day. A sample of one-week sales (Number of Liters) is observed as follows.

Day:	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Sales:	154	145	152	140	135	165	173

Examine whether the sales of milk are same over the entire week at 1% level of significance. (6)

7. The following data denotes the life of electric bulbs of four varieties. Test, Whether the average life of four varieties of bulbs is homogenous at 5% level of significance (6)

Variety	Sample size	Life of the electric bulbs in hours								
I	8	1560	1670	1580	1650	1640	1680	1600	1650	
II	9	1450	1460	1480	1450	1460	1440	1450	1480	1470
III	9	1430	1440	1450	1440	1430	1420	1410	1450	1470
IV	8	1540	1570	1550	1560	1570	1580	1530	1590	

SUPPLEMENTARY EXAMINATION
February 2019

MC – 207 Differential Equations and Applications

Time: 3 Hours
Max. Marks: 40

Note: Attempt all the questions by selecting any two parts from each question.

(1) (a) Find the general solution of the homogeneous linear system
$$\mathbf{x}' = \begin{pmatrix} 7 & 4 & 4 \\ -6 & -4 & -7 \\ -2 & -1 & 2 \end{pmatrix}\mathbf{x}.$$

(b) Solve the initial-value problem
$$\mathbf{x}' = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & -1 \\ 0 & 1 & 1 \end{pmatrix}\mathbf{x}, \quad \mathbf{x}(0) = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}.$$

(c) Find all solutions the equation
$$\mathbf{x}' = \begin{pmatrix} 7 & -1 & 6 \\ -10 & 4 & -12 \\ -2 & 1 & -1 \end{pmatrix}\mathbf{x}.$$

(08)

(2) (a) Use separation of variables and find product solution of partial differential equation
$$\frac{\partial^2 u}{\partial x^2} = 9\frac{\partial u}{\partial y}.$$

(b) Define the *Regular Sturm-Liouville problem*, and show that the following Bounded Value Problems(BVPs) is a Sturm-Liouville problem
(i) $x^2 y'' + xy' + \lambda y = 0;\quad y'(1) = 0, y'\left(e^{2\pi}\right) = 0, \lambda > 0$
(ii) $y'' + \lambda y = 0;\quad y(0) = 0, y(\pi) = 0, \lambda > 0$

(c) show that the set of eigenvalues corresponding to the set of eigenvalues is orthogonal with respect to the weight function $p(x)$ on the interval $[a, b]$.
(10)

(3) (a) Eliminate the arbitrary function from $z = f\left(x^2 + y^2\right)$ to obtain a first order partial differential equation.

(b) Find the general solution of the partial differential equation
$$(y + z)p + (z + x)q = x + y.$$

(c) Find the general solution of the partial differential equation
$$2xz - px^2 - 2qxy + pq = 0,$$
by using *Charpit's equation*.
(08)

(4) (a) Solve $\left(D^3 - 4D^2 D' + 4DD'^2\right)z = 4\sin(2x + y).$

(b) Solve
$$\left(D^2 D' - 2DD'^2 + D'^3\right)z = \frac{1}{x^2}.$$

(c) Find the general solution of equation
$$x^2\frac{\partial^2 z}{\partial x^2} + 2xy\frac{\partial^2 z}{\partial x\partial y} + y^2\frac{\partial^2 z}{\partial y^2} = \left(x^2 + y^2\right)^{n/2}$$
(08)

(5) (a) Solve the *Neumann problem*
$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

for a rectangular plate subject to the boundary conditions:
$$u_x(0, y) = 0 = u_x(a, y),\; u(x, 0) = x,\; and\; u(x, b) = 0.$$

(b) A bar AB of length 10 cm has its ends A and B kept at 30^0 and 100^0 temperatures respectively, until steady-state condition is reached. Then the temperature at A is lowered to 20^0 and that at B to 40^0 and these temperatures are maintained. Find the subsequent temperature distribution in the bar.

(c) Find a solution of BVP

$$\frac{\partial u}{\partial t} = k\frac{\partial^2 u}{\partial x^2}, \quad 0 < x < L, \quad t > 0$$

$$u(0, t) = 0, \quad u(L, t) = 0,$$

$$u(x, 0) = \begin{cases} 1, & 0 < x < L/2 \\ 0, & L/2 < x < L. \end{cases}$$

(08)

Total No. of Pages: 3   *Roll No................*

5th SEMESTER   **B. Tech. (MC)**

SUPPLEMENTARY EXAMINATION   **(February-2019)**

MC 301: Operating System

Time: 3:00 Hours   **Max. Marks: 40**

> **Note:** Answer **any five** questions. Use of calculator is permitted.
> Assume suitable missing data, if any.

Q1. a) Explain three types of Kernels.   (6)

   b) Explain medium term scheduler with diagram.   (2)

Q2. Describe two preemptive and two non-preemptive CPU scheduling
   algorithms by giving example for each one. Also draw Gantt chart
   and find out the average turnaround time and average waiting time
   in each example you have considered above.   (8)

Q3. Describe critical section problem with its solution. Write Peterson's
   algorithm and explain how it satisfies all requirements of solution of
   critical section problem?   (8)

Q4. a) On a system using simple segmentation, compute the physical
   address for each of the logical addresses, given the following
   segmentation table. If the address generates a segment fault,
   indicate so.   (4)

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

i)   0,99
ii) 2,78
iii) 1,265
iv) 3,222

b) Given references to the following pages by a program,
   0,9,0,1,8, 1,8,7,8,7, 1,2,8,2,7, 8,2,3,8,3,

How many page faults will occur if the program has three page frames available to it and uses Optimal page replacement algorithm?   (4)

Q5. a) On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space and a page size of 2^{10} bytes,
   i)   How many bits are in logical address?
   ii) How many bits in physical address specify the page frame?
   iii) How many entries are in page table?
   iv) How many bytes are in a page frame?
                                                    (1*4=4)

b) In this problem, use binary values, a page size of 2^6 bytes, and the following page table.

In/Out	Frame
Out	00101
In	00001
In	11011
In	11010
Out	10001
Out	10101
Out	11000
In	00101
....	....

Which of the following virtual addresses would generate a page fault? For those that do not generate a page fault, to what physical address would they translate?   (4)

a) 0000101101001
b) 0000010010010
c) 0000100010101
d) 0000001110101

Q6. a) On a disk with 5000 cylinders, numbers 0 to 4999, compute the number of tracks the disk arm must move to satisfy all the requests 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 in the disk queue. Assume the last request serviced was at track 143 and head is moving towards the track 4999. Perform the computation by using:
   i)   FCFS
   ii) SSTF
   iii) SCAN
   iv) LOOK   (4)
b) What are the major methods of allocating disk space to the files?   (4)

Q7. Write a short note on any four of the following: (2*4=8)
   i)   Swapping
   ii) Overlays with an example
   iii) Resource Allocation Graph
   iv) Need of disk scheduling
   v)   RAID 1

                  - END -

Total No. of Pages 2   ROLL NO............

FIFTH SEMESTER B.Tech. Mathematics & Computing

SUPPLEMENTARY EXAMINATION, *Feb 2019*

Code & Title: MC 303   Stochastic Processes

Time: 3:00 Hours   Max. Marks : 40

Note : Answer all question by selecting any two parts from each questions. All questions carry equal marks. Assume suitable missing data, if any.

1[a] Differentiate between a random variable and a random process. Classify a stochastic process based on its state and parameter with an example of each type and graphical representation.

[b] What is a Poisson process? Give example. State its important properties. Show that it is a Markov process.

[c] Describe birth and death process and find its steady state solution.

2[a] Describe random walk with two absorbing barriers. Show that the probability that the particle continues to move indefinitely between the two such barriers is zero.

[b] Show that in case of an unrestricted simple random walk, if the probability of a jump upward is greater than the probability of a jump downward, then the particle will drift to ∞ with probability one.

[c]Describe a random walk of your choice with finite number of states with one absorbing barrier and one reflecting barrier. Consider suitable values of the different parameters and find the probability of absorption.

3[a] Explain Bernoulli process? Give examples, both of homogeneous and non homogeneous.

[b] Explain ergodic Markov chain. Consider an ergodic Markov chain of your choice and find the steady state probability distribution for that. What is its significance ?

P -T.O.

[c] Two gamblers having an equal probability of loss or gain of Rs 1 at a time, start a game with a fortune of Rs 3 each. If at any stage a specific gambler is having fortune of Rs 4 then find the probability of losing all his fortune by the next 8 trials.

4[a] What's a renewal process. Give example. Consider a renewal counting process with a renewal function of your choice. Find the probability distribution of the number of renewals by a specific time of your choice.

[b] A service centre opens at 9 AM. From 9 AM until 3 PM customers arrive at a Poisson rate of four per hr. and from 3 PM until 9 PM arrival is at a Poisson rate of 6 per hr. Find the probability distribution of the number of customers entering the store on a given day. Also the mean and variance for the same.

[c] Define a Markov chain. Give example. How do you find n-step transition probability matrix of a Markov chain; explain by considering a suitable example.

5[a] Describe M/M/1 queuing system. Find the expected numbers in the queue, and in the system.

[b] Find the probability of losing a customer in M/M/c/c queue model by considering suitable values of the various parameters.

[c] In a railway yard goods trains arrive at the rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average of 36 minutes then find the (i) mean queue size, (ii) probability that the queue size exceeds 10, (iii) mean number of trains departed per busy period.

Total No. of Pages: 2   Roll No.................

5th SEMESTER   **B. Tech.**

SUPPLEMENTARY EXAMINATION   **(FEBRUARY-2019)**

MC 315: Modern Algebra

Time: 3:00 Hours   **Max. Marks: 50**

> **Note:** All questions are compulsory. Attempt **any two parts** from each question. Assume suitable missing data, if any.

Q1.a) Define Quaternion group and show that it is a non-abelian group of order 8.

b) Prove that the set of all n n^{th} roots of unity forms a cyclic group w.r.t. multiplication.

c) Find all the left cosets of $<H,+>$ in $<G,+>$, where $G = \mathbf{Z}$ and $H = \{5x : x \in Z\}$.

Q2.a) If G is a group and H is a subgroup of index 2 in G, prove that H is normal subgroup of G.

b) If G is a cyclic group and N is a normal subgroup of G, then show that G/N is cyclic. Also show by an example that the converse need not be true.

c) State and prove Fundamental Theorem of group homomorphism.

Q3.a) Show that the set of Gaussian integers $Z[i]$ is a commutative ring with unity.

b) Show by an example that union of two subrings of ring may not be a subring.

c) If F is a field of characteristic p (p is a prime), then show that

$$(a+b)^p = a^p + b^p \quad \forall\, a,b \in F.$$

Q4.a) Let $f : R \to R'$ be a homomorphism and A be an ideal of R. Show that $f(A)$ is an ideal of $f(R)$.

b) Find all maximal ideals of Z_{12}, the ring of integers modulo 12.

c) Show that every field F is a Euclidean domain.

Q5.a) Prove that a finite integral domain is a field.

b) In a PID, prove that any two greatest common divisors of a and b are associates.

c) Prove that $Z\left[\sqrt{-3}\right]$ is not a U.F.D.

- END -

Total No. of pages. 03
SEVENTH SEMESTER

SUPPLEMENTARY EXAMINATION

Roll No....................
B.TECH (MC)

FEBRUARY 2019

MC 405 GRAPH THEORY

Time: 3 Hours

Max.Marks: 40

Note: Answer ALL by selecting any two parts from each. All questions carry equal marks.

Q1(a) Let $G = (p, q)$ graph having p vertices and q edges all of whose vertices have degree k or $k + 1$. If G has $p_k > 0$ vertices of degree k and p_{k+1} vertices of degree $k + 1$ then show that
$$p_k = (k + 1)p - 2q.$$

(b) Define the Ring sum of two graphs and complement of a graph. Show that a graph is self complementary if it has $4n$ or $4n+1$ vertices.

(c) Prove that isomorphism of simple graphs is an equivalence relation.

Q2(a) Prove that a simple graph with n vertices and k components can have at most (n-k) (n-k+1)/2 edges.

(b) Prove that in a complete graph with n vertices, there are (n-1)/2 edge disjoint Hamiltonion circuits, if n is an odd number greater than or equal to 3.

(c) Prove that a connected graph G is an Euler graph iff it can be decomposed into circuits.
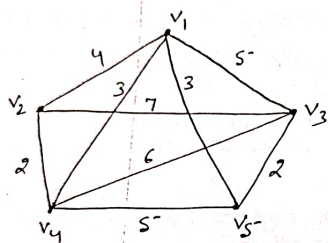
P.T.O.

Q3(a) Define binary tree. Prove that the maximum number of vertices in a binary tree of height h is $(2^h - 1)$, $h \geq 0$.
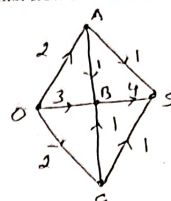
(b) Apply Dijkstra algorithm to find shortest path from s to t in the graph given below:
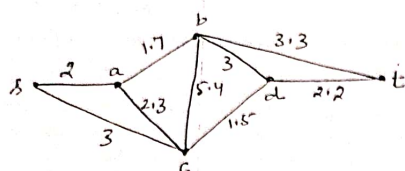
(c) Find the minimal spanning tree for the weighted graph given below:

Q4(a). Find a maximal flow in the network shown below:

(b) Prove that a vertex v of a connected graph G is a cut vertex iff there exist two vertices x and y in G such that every path between them passes through v.

(c) Show that every cycle in a graph has an even number of edges in common with any cut-set.

Q5 (a) Define a k-chromatic graph. Prove that every tree with two or more vertices is 2- chromatic. Find an example of a 2- chromatic graph which is not a tree.

(b) Define edge connectivity of a graph. Show that the edge connectivity of a graph G cannot exceed the minimum degree of a vertex in G.

(c) Define Perfect Matching in a graph. Find the number of perfect matching in the complete bipartite graph $K_{n,n}$.

END.

Total No. of Pages: 02

Roll No:....................

SEVENTH SEMESTER

B.Tech. [MC]

SUPPLEMENTARY EXAMINATION

Feb. 2019

MC409, Mathematical Modeling and Simulation

Time: 3.0 Hours

Max. Marks: 40

Note: *Attempt ANY eight questions. All questions carry equal marks. Assume suitable missing data, if any.*

1. Give a short note on Mathematical modeling and its purpose and uses.

2. For the data set below, determine if it is reasonable to assume that y is inversely proportional to x. If it is, approximate the constant of proportionality. If it is not, describe why this assumption is not reasonable.

x:	1	1.2	1.4	1.6	1.8	2
y:	6.85	6.21	4.24	4.32	3.92	3.18

3. For the given set of data, fit a quadratic function:

x:	−2	−1	0	1	2
y:	15	1	1	3	19

4. Discuss and drive cubic splines.

5. Discuss linear predator prey model.

6. Solve the mathematical model and discuss its stability.

$$\frac{dx}{dt} = ax + by \; ; \; \frac{dy}{dt} = cx + dy$$

7. Discuss Volterra's principle and Lanchester combat model.

8. Solve the difference equation:

$$y_n - 8y_{n-1} + 21y_{n-2} - 18y_{n-3} = 0$$

9. Discuss SIR continuous model.

10. Discuss Markov chain with an example.

1

2

Total No. of Pages: 02   Roll No..........
FIRST SEMESTER   **B.Tech. [All Groups]**

SUPPLEMENTARY EXAMINATION   February (2019)

AP-101: PHYSICS-I

Time: 3 Hours   Max. Marks: 40

Note: Attempt any *FIVE* questions. **Question No. 1 is compulsory.**
Assume suitable missing data, if any.

1. Answer all the following questions.   (2x6)

   (a). What do you mean by inertial frame of reference? Is earth an inertial frame of reference?
   (b). Why quartz is a doubly refracting substance but not glass? Explain.
   (c). Distinguish between plane polarized and circular polarized light.
   (d). Find the velocity with which a body should travel so that its length becomes half of the rest length.
   (e). Define 'attenuation' in optical fibre. Write the relation for signal attenuation per unit length in decibel for optical fibre.
   (f). Explain "metastable state" and 'stimulated emission' in LASER.

2(a). Explain the objective of Michelson- Morley experiment and also derive the expression for the fringe shift. Discuss the merits and demerits of this experiment.   (4)
   (b). Prove that $E^2 - p^2c^2 = m_0^2c^2$ is invariant under Lorentz transformation.   (3)

3(a). State and explain Brewster law. Show that when light is incident on a transparent substance at polarizing angle, the reflected and refracted rays are at right angle to each other.   (4)
   (b). Discuss Fresnel's diffraction at a straight edge and obtain the expressions for the locations of the bright and dark bands.   (3)

1

P.T.O

4(a). Write the equation of motion for a forced mechanical oscillator. Derive the expression for the displacement of a particle in a forced harmonic oscillator and discuss the variation of velocity amplitude and displacement amplitude with the driving force frequency (ω) for different value of damping constant. (4)

(b). Quality factor (Q) of a sonometer wire is 2×10^4. On plucking, it executes 240 vibrations per second. Calculate the time in which the amplitude decreases to $\frac{1}{e^2}$. (3)

5(a). Explain the term 'population inversion' in laser. Discuss the principle and working of Ruby laser with the help of suitable energy level diagram. (4)

(b). A laser source of wavelength 6000 Å, coherence width 4 mm and power 10 mW shines on a surface 100 m away. Deduce the (i): angular spread and (ii): areal spread. (3)

6(a). What is material dispersion? Prove that in case of material dispersion $\Delta\tau = -\frac{\lambda_0 l}{c}\frac{d^2 n}{d\lambda_0^2}\Delta\lambda_0$, where the symbols have their usual meaning. (4)

(b). Find the diameter of the core for single mode transmission at 8500 Å whose refractive indices for core and cladding are 1.48 and 1.47, respectively. (3)

7(a). Explain 'impedance matching; and its significance. Mention the conditions for energy reflection between two strings with an intervening string. (4)

(b). Define quality factor Q of a damped harmonic oscillator and obtain expression in terms of relaxation time. (3)

2

(b) An object is standing on a plane whose slope varies with constant velocity ω. After t seconds its position is **[4]**

$$s(\omega,t)=\frac{g}{2\omega^2}\left[\sinh(\omega t)-\sin(\omega t)\right]$$

where $g = 9.8$ m/s^2 denotes the gravity acceleration. Write a function script which takes in the values s and t and returns the value of ω using the *bisection method* with a tolerance of 10^{-5}. [given that $\omega_1 \le \omega \le \omega_2$]

6. (a) The motion of a damped spring-mass system is described by the following ordinary differential equation: **[4]**

$$m\frac{d^2x}{dt^2}+c\frac{dx}{dt}+kx=0$$

where x = displacement from the equilibrium position (m), t = time (s), m = 20 kg mass, and c = the damping coefficient (N.s/m). The damping coefficient c takes on three values of 5 (underdamped), 40 (critically damped), and 200 (over damped). The spring constant $k = 20$ N/m. The initial velocity is zero and initial displacement $x = 1$m. Solve this equation over the time period $0 \le t \le 15$ s. Plot the displacement versus time for each of the three values of the damping coefficient on the same plot with proper labeling.

(b) Write a Matlab program which executes the motion of small circle of radius (r) on the circumference of the circle of radius (R). **[4]**

P.T.O.

Total No. of Pages: 4

Roll No. ....

THIRD SEMESTER

B.Tech.[EP]

SUPPLYMENTRY EXAMINATION

(FEB.-2019)

EP-201 INTRODUCTION TO COMPUTING (NEW SCHEME)

Time: 3 Hours

Max. Marks: 40

> **Note: Question No. 1. is compulsory. Attempt any four from rest. Use comment line in each program to write the script/function file name.**

1. Following commands are written and saved in a Matlab script file. What will the output of this file in the command window? **[8]**

```
A = [2 4 7 8; 10 12 18 21; 3 5 7 9; 1 2 3 4];
B=reshape(A,8,2)
C=A.^2
floor([5.6 -3.5])
x=[ 11  15  17  20 ]; y=[ 10  12  40  55 ];
z= x >=y
```

2. (a) Explain the following commands with suitable examples **[4]**

   i.   save
   ii. holdon
   iii. figure
   iv. mesh

(b) The capacitance of two parallel conductors of length L and radius r, separated by a distance d in air, is given by **[4]**

$$C=\frac{\pi\varepsilon L}{\ln\left(\dfrac{d-r}{r}\right)}$$

where ε is the permittivity of air ($\varepsilon = 8.854 \times 10^{-12}$ F/m).

Write a script file that accepts user input for d, L, and r and computes and display the value of capacitance C with proper message including unit.

3. (a) The following table shows the time versus pressure variation reading from vacuum pump. Fit a curve, $P(t) = P_0 e^{-t/\tau}$, through the data and determine the unknown constants P_0 and τ. **[4]**

T	0	0.5	1.0	5.0	10.0	20.0
P	760	625	528	85	14	0.16

(b) Write a function file to print the first N terms of the famous Fibonacci series of thirteenth century in reverse order **[4]**

Fibonacci series: 1, 1, 2, 3, 5, 8, 13, 21, ...

4. (a) The period of a pendulum confined in the vertical plane is **[4]**

$$T = 4\sqrt{\frac{l}{2g}} \int_0^{\theta_0} \frac{d\theta}{\sqrt{\cos\theta - \cos\theta_0}}$$

Where $\theta_0 < \pi$ is the maximum angle between the pendulum and the downward vertical, l is the length of the pendulum, and g is the gravitational acceleration. Evaluate the integral numerically using *trapezoidal method* for $\theta_0 = \frac{\pi}{16}$ and compare your result with small angle approximation $T \approx 2\pi \sqrt{\frac{l}{g}}$. (Do not use inbuilt function)

(b) Write a Matlab code to print the following in the command window

```
1+1 =1
1+2=3
1+4=5
1+5=6
End of inner loop
```
[4]

```
2+1 =3
2+2=4
2+4 =6
2+5=7
End of inner loop
3+1 =4
3+2=5
3+4 =7
3+5=8
End of inner loop
End of outer loop
```

5. (a) In nuclear physics, the semi-empirical mass formula used to approximate the binding energy of an atomic nucleus is given by **[4]**

$$\frac{BE}{A} = a_v - a_s \frac{1}{A^{\frac{1}{3}}} - a_c \frac{z^2}{A^{\frac{4}{3}}} - a_a \frac{(N-Z)^2}{A^2} + a_p \frac{\delta}{A^{\frac{7}{4}}}$$

where $N = A - Z$, $a_v = 14.1$, $a_s = 13.0$, $a_c = 0.595$, $a_a = 19.0$, $a_p = 33.5$

$$\delta = \begin{cases} 1 \text{ if N is even and Z is even} \\ 0 \text{ if N is even and Z is odd} \\ 0 \text{ if N is odd and Z is even} \\ -1 \text{ if N is odd and Z is odd} \end{cases},$$

and for fixed mass number (A), the most stable nuclei are those having

$$Z = \frac{1}{2} A \frac{1}{1 + A^{2/3} \frac{a_c}{4a_a}}$$

The five terms in the right hand side of the first equation stands for volume, surface, Coulomb, asymmetry and pairing terms respectively. A, N and Z are mass, proton and neutron numbers respectively and hence they are integers. For $2 \le A \le 300$, plot BE/A versus A along with the five terms given in the first equations. Also find for which combination of N and Z, the BE/A is maximum.

> **Note :** Answer any FIVE questions.
> Assume suitable missing data, if any.

1. [a] State and prove Stoke's theorem in vector analysis (7)

   [b] Find the work done by the force $\vec{f} = (2y+3)\,\hat{\imath} + xz\,\hat{\jmath} + (yz-x)\hat{k}$, when it moves a particle from the point (0,0,0) to the point (2,1,1) along the curve $x = 2t^2$, $y = t$ and $z = t^3$. (3)

2. Define piezoelectric effect and converse piezoelectric effect. Discuss the Application of tensor analysis to the piezoelectricity and converse piezoelectricity. (10)

3. [a] State and prove the Cauchy-Riemann equations for a function of a complex variable to be analytic. (6)

   [b] Find the residues of $f(z) = \dfrac{ze^z}{(z-a)^3}$ at $z=a$. (4)

4. A thin rectangular plate whose surface is impervious to heat flow has arbitrary distribution of temperature f(x,y) at t=0. Its four edges x=0, x=a, y=0 and y=b are kept at zero temperature. Determine the subsequent temperature of the plate after time 't'. (10)

5. [a] Apply Runge-Kutta method to the equation $y' = x + y, y\,(0) = 1$ to determine x= 0.1 and 0.2 correct to four decimal places. (6)

   [b] Calculate the approximate value of *sin x* for *x= 0.54* using the following table: (4)

x	0.5	0.7	0.9	1.1	1.3	1.5
$\sin x$	0.47943	0.64422	0.78333	0.89121	0.96356	0.99749

6. Answer any *four* of the following: (4×2.5 = 10)

   [a] Define Kronecker delta and prove that (a) $\delta^j_k a^j = a^k$.

   [b] Find $\mathrm{div}\,\vec{f}$, where $\vec{f} = grad\,(x^3 + y^3 + z^3 - 3xyz)$.

   [c] Define Pole and residue of pole

   [d] Prove that (i) $E^{-1} = 1-\nabla$ (ii) $(1-\Delta)\,(1-\nabla) = 1$

   [e] Separate Log (1+i) in to real and imaginary parts.

Total No. of Pages 2

THIRD FOURTH SEMESTER — III   — 41 —

SUPPLEMENTARY EXAMINATION

Roll No. ... ...

B.Tech. [EP]

(February-2019)

EP- 205 Classical & Quantum Mechanics

Time: 3:00 Hours   Max. Marks : 50

> **Note:** Answer *any FIVE* questions. All questions carry equal Marks.
> Assume suitable missing data, if any.

Q1(a) State and Prove the law of conservation of angular momentum for a system of interacting particles using Lagrangian method. Explain the concept of cyclic coordinates? (5)

(b) Set up the Lagrange's equation of a particle moving on the surface of earth using spherical polar coordinates. (5)

Q2(a) Derive the equation of orbit of a particle moving under the influence of a central force consistent with the inverse square law and discuss briefly the special cases depending upon the Energy and hence of eccentricity. (5)

(b) The Force on a particle of mass m and charge e, moving with a velocity v in an Electric field $\dot{E}$ and magnetic field B is given by

$$F = e\,(\,E + \dot{v} \times B)$$ (5)

Obtain the Hamiltonian and Hamilton's equations for charged particle.

Q3(a) Discuss the stability condition for the central force field if the form of potential V(r) is ar^{n-1}, a being a constant and centrifugal energy is $V_c(r)$ is br^2, being positive constant. (5)

1

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(b) The wave function of a particle of mass m moving in a potential $V(x)$ is, $\varphi(x,t) = A \exp\left[-ikt - \frac{kmx^2}{\hbar}\right]$, where A and k are constants.

Find the explicit form of the potential $V(x)$. (5)

Q4(a) Explain the concept of probability amplitude and probability density. Show that the wave equation $\psi_{(x,t)} = A\cos(kx - \omega t)$ doesnot satis time dependent Schrodinger equation for free particle. (5)

(b) Determine the transmission coefficient for a particle of energy $E < V_0$ fo a rectangular barrier given by

$$V = 0 \text{ for } x<-a \text{ and } x>a$$

$$= V_0 \text{ for } -a<x<a,$$ Explain briefly its application to the observe phenomenon of alpha decay. (5)

Q5(a) Using the time independent perturbation theory, calculate the first order energy shift in the ground state by a perturbing potential ax^4 in t Hamiltonian of a linear harmonic oscillator ($V = 1/2kx^2$). (5)

(b) Write connection formulae for penetration through a barrier. Apply the meth to obtain the quantization condition for a bound state. (5)

Q6(a) Develop the stationary perturbation theory for a non-degenerate case up to the second order. (5)

(b) If $H = \frac{1}{2}mq^2 + V(q)$ then Show that $\frac{ih}{2\pi}\dot{q} = qH - Hq$ is satisfied

if $qp-pq = \frac{ih}{2\pi}$. (5)

2

B.Tech. [EP]

THIRD SEMESTER

SUPPLEMENTARY EXAMINATION   *February-2019*

EP-207: Digital Electronics
(Engineering Analysis and Design)

Time: 3:00 Hours   *Max. Marks : 40*

> **Note :**   **Ques.1 is compulsory.** Attempt 4 questions in all. All questions carry equal marks. Assume suitable missing data, if any.

Q.1. (a) Differentiate between Sequential Logic Circuit and a Combinational Logic Circuit. [2]

(b) Show how to connect NAND gates to get an AND gate and OR gate. [2]

(c) Compare SRAM and DRAM in terms of cost, size, speed and application. [2]

(d) A count recorded by a counter at its output is 1010. What is the time delay required for the next count change? Given: Turn On Delay = 30 ns and Turn Off Delay = 10 ns. [2]

(e) Describe Fan-In and Fan-out in context with the TTL Logic Families? [2]

Q.2. (a) Explain the working of a 4-bit Successive Approximation Analog to Digital Converter. Define Monotonicity with reference to ADC. [5]

(b) Perform the BCD Addition and XS-3 Addition of the following two numbers: 2256 and 1044. [5]

Q.3. (a) Design a non-sequential counter such that it generates the sequence of mentioned states (2,6,4,3) using D Flip-flops. Also check for the bush condition. [5]

(b) Design and discuss Bidirectional Shift Registers with a suitable example in each case of Left Shift and Right Shift. [5]

Q.4. (a) We can expand the word size of a RAM by combining two or more RAM chips. Draw a block diagram to show how we can use 8 x 4 RAM chips to obtain a 8 x 8 RAM. [5]

(b) Convert SR flip-flop to T flip-flop and obtain the conversion table, the corresponding logic diagram and the equations relating the input and outputs of the 2 flip-flops. [5]

Q.5. (a) Write a VHDL Code for 3 to 8 line decoder using DataFlow Modeling. [5]

(b) Implement the following function using a multiplexer:
$F(A, B, C, D) = \Sigma (0, 1, 3, 6, 7, 11, 15)$ [5]

— 44

FIFTH SEMESTER

SUPPLYMENTARY EXAMINATION   (February-2019)

EP-301-Semiconductor Devices

Time : 3:00 Hours   Max. Marks: 50

Note: Answer *ANY FIVE* questions
· Assume suitable missing data, if any.

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1. (a). Write the postulates of classical free electron theory and derive density of states expression. Explain the significance of density of state function in semiconductors.   (7)

(b). Find drift velocity electron in a copper metal wire of cross sectional area 20 mm^2 carrying a current of 50 amp. Assume that each copper atom contributes two electrons for the conduction process. [Density of copper = 8.92×10^{23} Kg/m^3, Atomic weight of copper = 63.5].   (3)

2. (a). Define Hall Effect and deduce an expression for carrier concentration. Write the applications of the Hall Effect.   (7)

(b) A semiconductor crystal of 10 mm long and 2 mm thick has been exposed for a magnetic field of 1 wb/m^2 perpendicular to the largest face. When a current of 10 mA flows through the specimen along the length wise then calculate carrier concentration in the semiconductor. [Measured Hall voltage is 37 micro volts]   (3)

3. (a). Deduce the expressions for thermal equilibrium electron and hole concentrations in conduction and valance band of a semiconductor respectively.   (7)

(b). Calculate thermal equilibrium hole concentration in silicon at T=400K. (Fermi energy level is 0.27eV above the valance band and effective density of state function in valance band for silicon at T=300K is 1.04×10^{19}/cm^3).   (3)

4. (a). What are degenerate and nondegenerate semiconductors? Deduce the expression for thermal equilibrium electron and hole concentrations in terms of intrinsic carrier concentration.   (7)

(b).What is a compensated semiconductor? Deduce an expression for electron and hole concentrations in a compensated semiconductor.   (3)

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5. (a). Compare the working conditions of Bipolar Junction Transistor (BJT) and Field Effect Transistor (FET). (7)

(b). Explain how BJT works as an amplifier. Deduce an expression for collector current in terms of amplification factor in a common base configuration. (3)

6. Write in detailed about the following (3+3 +4)

(a). Zener break down

(b). MOSFET

(c). Tunnel diode

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Total No. of Pages 1

Roll No........

FIFTH SEMESTER

B.Tech. (Engineering Physics)

SUPPLEMENTARY EXAMINATION

FEBRUARY 2019

EP 303(New Scheme) : ELECTROMAGNETIC THEORY, ANTENNA &

PROPAGATION

Max. Marks : 40

Time : 3.00 Hrs

Note : Attempt any five Questions

Assume suitable missing data, if any (4)

1.(a) Explain with schematic diagram
    (i) Reflection Coefficient (ii) Transmission Coefficient .
  (b) What are the applications of Smith Chart?. Explain (i) Single stub matching (ii)
    double stub matching. (4)

2.(a) Using Maxwell's equations derive the electric and magnetic wave equations,
    $\nabla^2 \overline{E} = \gamma^2 \overline{E}$ and $\nabla^2 \overline{H} = \gamma^2 \overline{H}$, where $\gamma = \sqrt{j\omega\mu(\sigma + j\omega\varepsilon)} = \alpha + j\beta$ is the intrinsic
    propagation constant of a medium. (4)
  (b) What do you understand by the terms- cutoff wavelength, dominant mode, guide
    wavelength, phase velocity, group velocity and wave impedance for rectangular
    waveguides. (4)

3.(a) Write the Maxwell's equations in differential and integral form. Also give their
    physical significance. (4)
  (b) Differentiate between waveguides and two wire transmission lines with example. (4)

4.(a) What is an antenna arrays? Show that the normalized array factor is a function of
    the geometry of the array and the excitation phase. (4)
  (b) What do you mean by (i) Radiation resistance (ii) Directivity (iii) Effective Area
    (iv) Half-Power Beam Width of an antenna. (4)

5.(a) What do you mean by (i)ground waves, (ii) space waves, and (iii) sky waves (4)
  (b) Discuss briefly the propagation of electromagnetic waves in ionosphere. Show
    that ionosphere behave as a medium of refractive index
$$n = \left(1 - \frac{81N}{f^2}\right)^{1/2} .$$
    (4)

6.(a)An air-filled rectangular waveguide of inside dimensions 6x4 cm operates in the
    dominant TE$_{10}$ mode. (4)
    (i) Find the cutoff frequency (ii) Determine the phase velocity of the wave in the
    guide at a frequency of 4GHz (iii) Determine the guide wavelength at the same
    frequency.
  (b)Show that the the ratio of the cross-section of a circular waveguide to that of a
    rectangular one A$_c$/A$_r$=2.17 if each is to have the same cutoff wavelength for its
    dominant mode. (4)

SUPPLEMENTARY EXAMINATION   Feb-2019

EP-305 Atomic and Molecular Physics

Time: 3 Hours   Max. Marks: 50

Note:	Answer ALL questions.
	Assume suitable missing data, if any.

Part A (Atomic Physics)

Q1. (a) Prove that the number of degenerate eigenfunctions for an one-electron atom corresponding to a particular eigenvalue is n^2. Show that the total number of electrons in a shell is $2n^2$, where n is the principal quantum number of the shell.   (5)

(b) Write the values of quantum numbers l, s and j corresponding to each of the following one-electron terms. Is $^2D_{1/2}$ a possible term?   (5)
$$^2S_{1/2}, {}^2P_{1/2}, {}^2P_{3/2}, {}^2D_{3/2}, {}^2D_{5/2}$$

Q2. (a) What were the challenges of Bohr-Sommerfeld theory? Enumerate the possible values of j and m_j for states in which l=2 and s=1/2.   (5)

(b) Distinguish between L-S and j-j couplings schemes in the case of two-valence electron systems. The quantum numbers of two electrons in a two valence electron atom are:

$$n_1= 2, l_1 = 1, s_1 = \tfrac{1}{2} \text{ and } n_2= 3, l_2 = 0, s_2 = \tfrac{1}{2}$$

Assuming L-S coupling, find possible values of L and hence of J.
Assuming j-j coupling, find possible values of J.   (5)

Q3. Write short notes on any **TWO** from the following: (2½×2= 5)

(a) Space quantisation

(b) Larmor precession

(c) Parity of eigen functions

Part B (Molecular Physics)

Q1. Answer any **Three** of the following   (5 × 3 = 15 marks)

(a) Distinguish between symmetric top (prolate and oblate), spherical top and asymmetric top molecules. To which symmetric top, the benzene (C_6H_6) molecule belong?

(b) State the Franck-Condon principle. How does it help in understanding the intensity distribution in the vibrational structure of the electronic transition of a diatomic molecule?

(c) The O-H-radical has a moment of inertia of 1.48×10^{-40} gm.cm². Calculate its internuclear distance. Also calculate for j=5, its angular momentum and angular velocity. Determine the energy absorbed in the J=6 →J=3 transition in cm^{-1} and erg/molecule. (Given $h=6.62 \times 10^{-27}$ erg-sec.).

(d) Discuss Anharmonic oscillator and calculated the transition frequency of fundamental absorption, first and second overtones.

Q2. Describe any **Two** of the following   (5 × 2 = 10 marks)

(d) Luminescence and types of luminescence

(e) Kasha's rule, quantum yield and lifetime

(f) Predissociaiation and Dissociation

(g) Spectrophotometer

Total no. of pages: 2

Roll No.............

FIFTH SEMESTER

B. Tech. [ALL]

Supplementary EXAMINATION

Feb- 2019

EP311 Computer Networks

Time: 3:00 Hours

Max. Marks: 50

Note: Answer any FIVE questions .
All questions carry equal marks. Drawn neat diagram wherever necessary. Assume suitable missing data, if any.

1 [A] With the help of a suitable block diagram explain concept of layered architecture of a computer network. [5]

[B] Draw the TCP/IP protocol and explain functions of each layer briefly [5]

2 [A] What are the functions of data link layer explain in detail? [5]

[B] Differentiate between flow control and error control. How is flow control managed at data link layer? [5]

3 [A] Given the following network addresses, find the class, the block, and the range of the addresses. Also represent the same in Classsless format . [5]
i. 123.12.0.0
ii. 212.80.56.0

[B] What is the Network ID, subnet mask , broadcast address, First Usable IP and Last Usable IP on the subnet that a node 192.186.1.15/28 belongs to? If the given block was to be divided among four subnets determine the First and Last Usable IP of each subnet. [5]

4 [A] What are the drawbacks of Distance Vector Routing. [5]

[B] Explain the working of Link state routing ? [5]

5 [A] Draw the datagram header format for IPv4, explaining the function of each fields. [5]

[B] Compare IPv6 and IPv4 ? [5]

6 [A] Compare the TCP and UDP header format and thereby justify their suitability for connection oriented/less protocol for process to process communication. [5]

[B] How do firewalls ensure the security of a computer network? [5]

7 Write short notes on any TWO [5X2]

[A] The WWW, HTTP and FTP

[B] The Domain Name System

[C] Ethernet as a LAN standard

SUPPLEMENTARY EXAMINATION   February-2019

EP-407 MOBILE AND SATELLITE COMMUNICATION

Time: 3:00 Hours

Max. Marks: 40

Note: Answer **ALL** questions.

Assume suitable missing data, if any.

Q1: (i) What are the possible sources of Noises in wireless communications? Explain the concept of wireless communication system along with the role of system capacity and interference?   (2)

(ii) Explain the role of multiple access techniques in detail with core difference among CDMA, FDMA, TDMA.   (3)

(iii) If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for mentioned system. Assume that "If the total of 22 MHz of bandwidth is allocated to a particular Frequency Division Duplex cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels", Calculate the number of channels available per cell if a system uses 12 cell reuse.   (3)

Q2: (i) An 400 KHz carrier is modulated by 15 kHz signal. What are the various frequencies contained by the modulated wave?   (2)

(ii) what is the frequency reuse factor and cluster size that should be used for maximum capacity if the path loss component is n=5? Assume that there are 6 co-channel cells in the first tier, and all of them are at the same distance from the mobile? Use suitable approximations and a signal to interference ratio of 15 dB is required for satisfactory forward channel performance of a cellular system.   (3)

(iii) Define trunking efficiency? Illustrate the role and importance of bandwidth requirement in wireless communication along with Grade of Service (GoS)?   (3)

Q3: (i) What are different medium characteristics for digital communication? Explain different modulation techniques for digital signals?   (4)

(ii) Explain in brief time division multiplexing and frequency division multiplexing? Explain the difference among ASK, FSK and PSK?   (4)

Q4: Discuss any **FOUR** from the following: (4x4=16)
  (a) Modulator and de-modulator, Limitations of AM
  (b) Cellular Mobile Radio Systems
  (c) Set-up time, Holding time, Request rate
  (d) Traffic intensity and system capacity
  (e) Difference between DPSK and QPSK
  (f) Modulation factor, Co-channel interference

Total No. of Pages: 3

THIRD SEMESTER

B.Tech. [BT]

SUPPLEMENTARY EXAMINATION

February 2019

BT201 Introduction to Biotechnology (New scheme)

Time: 3:00 Hours

Max. Marks: 50

Note: Answer *ALL* questions. All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 [A] Attempt any TWO of the following   [2½+2½]
   (i)   Describe the following terms (a) Stem cells; (b) Nutraceuticals;
         (c) Reproductive cloning; (d) Bioremediation; (e)
         Biomineralization
   (ii) Name any five Delhi-based institutes under CSIR working in the
         area of Biotechnology
   (iii) Describe the contributions of following scientists: (a) Watson
         and Crick; (b) Griffith; (c) Chargaff; (d) Christian Gram; (e)
         Francis Crick
   (iv) Describe the biochemistry involved in curd manufacture
   [B]   Discuss in detail the applications of Biotechnology, five each in
         health and agriculture sectors   [5]

Q.2 [A] Attempt any TWO of the following   [2½+2½]
   (i)   Write in brief about the structure and function of <u>any two</u> of the
         following (a) Lysosome; (b) Bacterial flagella; (c) Centrosome;
         (d) Actin filaments; (e) Nucleoporins and their role
   (ii) Write in brief about of the following characteristics of living
         organisms (a) Responsiveness; (b) Protoplasm; (c) Organ
         system; (d) Healing and regeneration; (e) Catabolism and
         anabolism
   (iii) Write about <u>any five</u> of the following
         (a) Confined localization of hydrogen peroxide
         (b) Mitochondrial membrane system
         (c) Semiautonomous organelles in eukaryotes
         (d) Resistance and bacteriocinogenic plasmids

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(e) Plant vacuole
(f) Principle of Gram staining

[B] Describe in detail the structure, function and dynamics of plasma membrane [5]

Q.3 [A] Attempt any TWO of the following [2½+2½]
(i) Differentiate between any two of the following
(a) Storage polysaccharide and Structural polysaccharide
(b) Polar amino acids and Nonpolar amino acids
(c) Aldose sugar and Ketose sugar
(d) Glycoproteins and Proteoglycans
(ii) Write in brief about any one of the following
(a) Salient features of algae
(b) Chemical composition of DNA
(iii) Describe the characteristic features of bacteria

[B] With respect to enzyme, write in brief about the following
(i) Specificity
(ii) Classification [2½+2½]

Q.4 [A] Attempt any TWO of the following [2½+2½]
(i) Write in brief about the following
(a) Restriction enzymes
(b) DNA ligase
(c) Properties of ideal cloning vector
(d) Catenation
(e) Prokaryotic promoter
(ii) Describe the terms: (a) Monocistronic; (b) Exons; (c) Transpeptidation; (d) Hybrid state model for translocation; (e) Operon
(iii) Give a descriptive account of Avery, McLeod and McCarty experiment

[B] Describe in detail the initiation phase of prokaryotic DNA replication explaining the functions of all the proteins/ enzymes involved [5]

P.T.O.

2

Q.5 [A] Attempt any TWO of the following [2½+2½]
(i) Compare and contrast polyacrylamide gel electrophoresis and SDS-PAGE
(ii) Describe the principle and procedure of ion exchange chromatography
(iii) Explain the principle and procedure of differential centrifugation

[B] Attempt any TWO of the following [2½+2½]
(i) How is agarose gel electrophoresis employed for separation of DNA fragments of different sizes?
(ii) Give the principle and procedure of isoelectric focussing
(iii) Compare and contrast velocity sedimentation and equilibrium sedimentation

END

3

Total No. of Pages _1

Roll No. ......

3rd_ SEMESTER

B.Tech. [BIOTECH]

Supplementary Examination

Feb-2019

BT _ 203

Biochemistry

Time: 3:00 Hours

Max. Marks : 40

> **Note : Answer any 5 questions from the following**
> Assume suitable missing data, if any.

1. Write brief short notes on the following:
   a. Coenzymes
   b. Ketone bodies
   c. Covalent vs non covalent interactions
   d. Protein structures

2. Compare in detail glycolysis and gluconeogenesis.

3. Give a detailed account of ATP yield through oxidative phosphorylation.

4. Discuss regulation of fatty acid metabolism. How is the liver an important organ for fatty acid metabolism?

5. What are purines and pyrimidines? Briefly explain amino acid biosynthesis

6. Describe the following cyles in brief giving suitable schematic diagrams:
   a. Urea Cycle.
   b. Krebs Cycle

Total No. of Pages 01   Roll No. ....

THIRD SEMESTER   **B. Tech [BT]**

SUPPLEMENTARY EXAMINATION   *FEB-2019*

BT 205: Chemical Engineering Principles

Time: 3:00 Hours   *Max. Marks: 40*

> **Note:** Answer FIVE questions. Question No. 1 is compulsory
> Assume suitable missing data if any.

Q.1 [a] What do you mean by the term EMP Pathway.   [12]

[b] Explain the relation between μ and Ks.

[c] Define Nabla factor.

[d] What are the different methods of heat transfer.

[e] Why measurement of biochemical process variables are important.

[f] Why airlift reactor is better than bubble column reactor.

Q.2 [a] What do you mean by substrate utilization kinetics.   [3]

[b] Explain Kreb cycle along with ATP generation involved in respiration.   [4]

Q.3 [a] What do you mean by doubling time of a biomass.   [3]

[b] A plasmid containing strain of *E. coli* is used to produce recombinant protein in a 250 litre fermenter. The probability of plasmid loss per generation is 0.005. The specific growth rate of plasmid free cells is 1.4 h^{-1}; the specific growth rate of plasmid bearing cells is 1.2 h^{-1}. Estimate the fraction of plasmid bearing cells after 18 h growth if the inoculum contains only cells with plasmid.   [4]

P. T. O.

Q.4 [a] Explain the different methods of media sterilization. [3]

[b] Write the differences between batch and continuous mode of sterilization. [4]

Q.5 [a] What is the difference between homogeneous and heterogeneous reaction system. [3]

[b] Explain the different types of immobilization methods. [4]

Q.6 [a] Discuss the various factors affecting oxygen mass transfer in fermentation broth. [3]

[b] How biochemical process variables are measured and control in a bioreactor. [4]

END

Total No. of Pages: 2

III SEMESTER

SUPPLEMENTARY EXAMINATION

Roll No. ....

B.Tech. [BT]

February 2019

BT207 Engineering Analysis and Design (New scheme)

Time: 3 Hours

Max. Marks: 40

Note: Answer *ALL* questions. All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 [A] Attempt any TWO of the following [2+2]
  (i) Describe the application of gasification, pyrolysis and geosequestration in biofuel production from lignocellulosic biomass
  (ii) Describe any two antagonistic approaches of biocontrol. What carriers are used in biocontrol formulation?
  (iii) Give a flowsheet representation of vaccine manufacturing with brief details of each step

 [B] Answer the following [2+2]
  (i) Describe various treated vessels for adherent culture of animal cells. What is meant by feeder layer?
  (ii) Describe the functions of various genes localized on T-DNA of pTi plasmid. *vir* genes can act in *trans*. How is this fact exploited in pTi based vector construction?

Q.2 [A] Attempt any TWO of the following [2+2]
  (i) Enumerate various accessories present in a fermentor along with their functions
  (ii) Compare and contrast cassette mutagenesis and doped cassette mutagenesis
  (iii) Write in brief about inoculation, growth and production media for fermentative production of a microbial metabolite
  (iv) Give schematic representation of the general scheme of cycle for protein designing by directed evolution method

P.T.O.

1

 [B] Answer the following [2+2]
  (i) Write in brief about the principle and procedure of affinity chromatography. How is this technique applied for the eukaryotic mRNA purification?
  (ii) Briefly describe rotor, particle (spherical) and medium parameters affecting centrifugation

Q.3 [A] Attempt any TWO of the following [2+2]
  (i) Describe the principle and working of biosensor
  (ii) Enumerate various properties of biomaterials
  (iii) What are biomaterials? Describe their medical applications

 [B] Explain in detail any two applications of biosensor in health sector [4]

Q.4 [A] Attempt any TWO of the following [2+2]
  (i) Describe the principle of SDS-PAGE
  (ii) Write the principle and working of mass spectrometer
  (iii) Compare and contrast adsorption and partition chromatography

 [B] Answer the following [2+2]
  (i) Describe the principle and procedure of sandwich ELISA
  (ii) Compare and contrast indirect ELISA and direct ELISA

Q.5 [A] Attempt any TWO of the following [2+2]
  (i) Give an account of the following: (a) Cradle-to-grave variant of life cycle assessment; (b) Damage oriented method of life cycle impact assessment
  (ii) What are carrier ampholytes and ampholines? How are these used for the generation of pH gradient gel for isoelectric focussing?
  (iii) Describe the terms - life cycle inventory and life cycle impact assessment

 [B] Answer the following [2+2]
  (i) Define isoelectric point (pI). Also describe the correlation between pI of protein and pH of the medium
  (ii) Give a process diagram indicating life cycle assessment

END

2

Total No. of Pages: 2

Roll No. ....

FIFTH SEMESTER

B. Tech. [BT]

SUPPLEMENTARY EXAMINATION

February 2019

BT325 Cell Biology (New scheme)

Time: 3:00 Hours

Max. Marks: 50

Note:	Answer **ALL** questions. All questions carry equal marks. Assume suitable missing data, if any.

Q.1 [A] Attempt any TWO of the following [2½+2½]

    (i) Write in detail the structures of <u>any five</u> of the following: (a) Mitochondrial inner membrane; (b) Lysosomal membrane; (c) Endoplasmic reticulum cisternae; (d) Chloroplastic thylakoids; (e) Nuclear pore complex; (f) Flagellar axoneme

    (ii) Enlist salient features and various functions of plant vacuole <u>or</u> Golgi complex. Which of its subcompartment is sorting center?

    (iii) Give a descriptive account of the structure and functions of and Bacterial cell wall <u>or</u> Plant cell wall

  [B] Discuss in detail the fluid mosaic model of the structure of plasma membrane. Also discuss the dynamics of cell membrane [5]

Q.2 [A] Attempt any TWO of the following [2½+2½]

    (i) Discuss the roles of Bcl-2 family of proteins, IAPs, lack of survival factors and caspases in apoptosis. How is apoptosis different from necrosis?

    (ii) Give a descriptive account of cell cycle regulation by cyclin dependent kinases

    (iii) Write in brief about the following: (a) G1 phase; (b) G$_0$ phase; (c) G1 checkpoint; (d) G2 check point; (e) Metaphase to anaphase transition

  [B] Answer any TWO of the following [2½+2½]

    (i) How does meiosis lead to genetic variability?

    (ii) Discuss the role of microtubules and motor proteins during metaphase and anaphase of mitosis

P.T.O.

1

    (iii) Describe the role of APC ubiquitin ligase in the process of mitosis

Q.3 [A] Attempt any TWO of the following [2½+2½]

    (i) Write in detail about the following: (a) Extracellular matrix; (b) Communicating junctions

    (ii) Briefly describe <u>any two</u> of the following: (a) Phagocytosis and Pinocytosis; (b) Synaptic signaling; (c) Clathrin mediated receptor mediated endocytosis of cholesterol

    (iii) Give an account of uphill transport across plasma membrane. How is it different from facilitated diffusion?

  [B] Enumerate various types of cell surface receptors. Describe in detail G-protein linked receptor mediated signaling [5]

Q.4 [A] Attempt any TWO of the following [2½+2½]

    (i) Describe the roles of following in cell signaling: (a) Relay proteins; (b) Messenger proteins; (c) cAMP; (d) Transducer proteins; (e) Anchoring proteins

    (ii) Write in detail about vesicle budding and fusion during vesicular transport of proteins

    (iii) Give a descriptive account of protein targeting to plasma membrane <u>or</u> nucleus

  [B] How are cytosolic proteins imported into various subcompartments of mitochondria? [5]

Q.5 [A] Attempt any TWO of the following [2½+2½]

    (i) Describe the role of p53 during DNA damage

    (ii) What are protooncogenes? How are these converted to oncogenes?

    (iii) Describe the mechanism of following during cancer development: (a) Angiogenesis; (b) Metastasis

  [B] Give a detailed account of any five therapies specifically targeting cancer cells [5]

END

2

Total No.of pages 1
THIRD SEMESTER
SUPPLEMENTARY EXAMINATION

Roll.No-----------
B.TECH [CE]
[FEB-2019]

CE-201 BASIC CIVIL ENGINEERING & APPLICATIONS

Time : 3:00 Hours

Max Marks :40

Note:

Answer any four questions.
All Question carry equal marks
Assume suitable missing data, if any

1. a. What are the different components of a building? Explain the same with the help of sketches wherever possible.

   b. Write short notes on the following:

   (i) Raft Foundation
   (ii) Typical footing on a brick wall and R.C.C column giving suitable dimensions

2. a. What is meant by damp-proof construction and what are the materials used for the damp-proof construction?

   b. What are the visible signs of the action of dampness in a building and what precautions are necessary to avoid the same.

3. a. What type of stone masonary will you use for
   (i) Boundary Wall (ii) Parapet Wall (iii) Pier of a Bridge

   b. State the general principles to be observed during the construction of brick masonary work.

4. a. Explain in detail in design mix procedure as per IS:10262.

   b. Brief the importance of water-cement ration and use of superplasticisers in concrete mix design.

5. a. Describe in detail the optical properties of minerals.

   b. Describe in detail the physical & chemical weathering.

THIRD SEMESTER   **B.TECH. [Civil Engineering]**
SUPPLYMENTARY EXAMINATION   **(FEBRUARY 2019)**
CE 203: ENGINEERING MECHANICS
Time: 3 Hours   *Max. Marks: 40*

Note: Question 1 is compulsory. Answer any FIVE questions from the
remaining. Assume suitable missing data, if any.

Q.1 Describe with example any five of the following (5×3=10)
- I.   Polygon Law of Forces
- II.   Parallelogram Law of Forces
- III.   Varignon's Theorem
- IV.   Parallel Axes Theorem
- V.   Perpendicular Axes Theorem
- VI.   Lami's Theorem.

Q.2 Determine the reactions at A for the cantilever beam
shown in fig.q2.   6

Q.3 A 75 kg man stands on the middle rung of ladder AB of
weight 25 kg, which is supported on smooth wall and
smooth floor. A string OC holds the ladder in position
preventing it from slipping (fig.q3). Determine the tension
in the string and the reaction at the supports.   6

Q.4 Blocks A and B have masses 400kg and 200kg
respectively and rest on $20°$ incline. Blocks are attached to
a post by cords and the post is held fixed by action of
force F (fig.q4). Assuming all contact surfaces smooth and
cords parallel to incline, determine the value of force F.   6

Q.5 The rigid beam ABCD is supported and loaded as shown
in fig.q5. If the spring constant is 20 N/mm for both the
springs, determine the reaction at A and force in each
spring.   6

P·T·O'

Q.6 Find the forces in the member FH, GH and GI in the truss as shown in fig.q6.   6

Q.7 In a simple machine, whose velocity ratio is 30 a load of 2400 N is lifted by an effort of 150 N and a load of 3000 N is lifted by an effort of 180 N. Find the law of machine and calculate the load that could be lifted by a force of 200 N. Also calculate:

(1) Amount of effort wasted in overcoming the friction
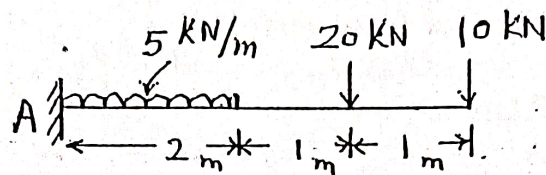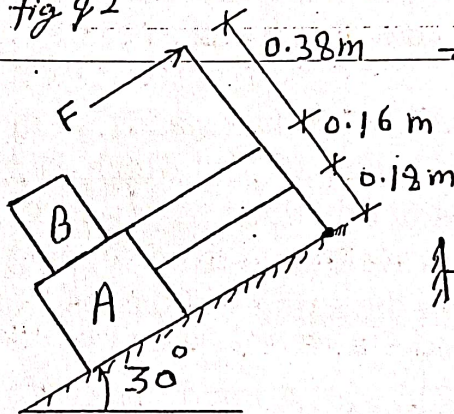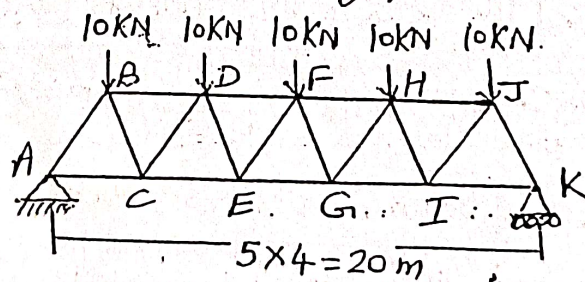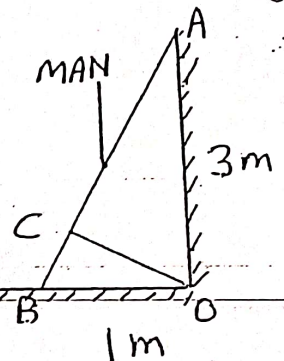(2) Mechanical advantage
(3). Efficiency   6

fig q2

fig q3

fig q4

fig q5

fig q6
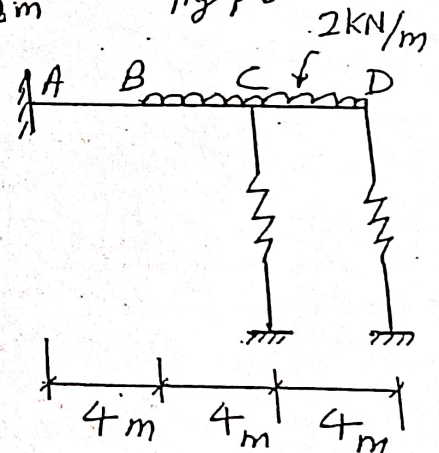
THIRD SEMESTER

SUPPLEMENTARY EXAMINATION

B.Tech. (Civil)

FEBRUARY-2019

CE-205 FLUID MECHANICS

Time: 3:00 Hours

Max. Marks: 40

> **Note :** Answer any *FIVE* questions.
>
> Assume suitable missing data, if any.

1. (a) A U- tube is made up of two capillaries of bores 1.0mm and 2.2mm, respectively. The tube is held vertically with zero contact angles. It is partially filled with liquid of surface tension 0.06N/m. If the estimated difference in the level of two menisci is 15mm, determine the mass density of the liquid. (2)

(b) How does viscosity of a fluid vary with temperature? (1)

(c) A triangular plate of 1m base and 1.5m altitude is immersed in water with its base near to free surface. The plane of the plate is immersed in' such a way that it makes an angle of 30° to the free surface of water and the base is parallel to and at a depth of 2 m from the water surface. Find the total pressure on the plate and the position of the centre of pressure. (5)

2. (a) Explain with neat sketch the working of pressure gauge (2)

(b) The barometric pressure at sea level is 760 mm of mercury while on a mountain top it is found to be 735mm. If the specific weight of air is assumed constant at 11.8 N/m², calculate the height of the mountain. (2)

(c) A velocity filed is given by $u = 3y^2$, $v = 2x$ and $w = 0$ in arbitrary units. Is this flow steady or unsteady? Is it two-dimensional or three-dimensional? At (x, y, z) = (2, 1, 0,) Compute (a) Velocity (b) local acceleration and (c) convective acceleration. (4)

3. (a) What is meant by stability of a floating body? Explain the stability of a floating body with reference to its metacentric height. (2)

(b) State the limitations of the Bernoulli's theorem (2)

(c) A crude oil of specific gravity 0.9 flows through a horizontal pipe 100 mm in diameter and 10 m long and 1000 kg of oil is collected in 5 mins. If the pressure difference at the two ends is 14.715 KN/m², Calculate the viscosity of the oil. (4)

4(a) A pipe 300m long has a slope of 1 in 100 and tapers from 1m diameter at the high end to 0.5 m at the low end. Quantity of water flowing is 0.09 cumecs. If the pressure at the high end is 68.670 KN/m², find the pressure at the lower end. (3)

P-T·O

(b) What is repeating variables? How are they selected for dimensional analysis? (2)

(c) The pressure difference Δp in a pipe of diameter d and length l due to turbulent flow depends upon the velocity v of the fluid, density ρ of the fluid, viscosity μ of the fluid and roughness k. Using Buckingham's π- theorem or otherwise obtain an expression for Δp. (3)

5(a) Explain with the help of sketch

    (a) Hydraulic gradient line
    (b) Pipes in parallel
    (c) Equivalent pipe
    (d) Pipes in series (2)

(b) For a laminar steady flow, prove that pressure gradient in the direction of motion is equal to the shear gradient normal to the direction of motion. (2)

(c) An oil of viscosity of 10 poise and specific gravity 0.6 flows through a horizontal pipe of 30mm diameter. If the pressure drop in 50 m length of the pipe is 3000KN/m², determine the

    (a) Rate of flow of oil in cumecs
    (b) Centre-line velocity
    (c) Total frictional drag over 50 m length of the pipe
    (d) Power requirement to maintain the flow
    (e) Velocity gradient at the pipe wall. (4)

6(a) In a FM Lab, a pipe 60 m long and 0.15 m diameter is used to find the coefficient of friction. The supply head is arranged at 2.6 m above the centre of pipe. The discharge through the pipe in one of the trials is measured to be 0.032 cumecs. What will be the value of coefficient of friction when

(a) taking all losses

(b) neglecting all losses except friction. (2)

(b) Why resultant pressure on a curved submerged surface is determined by finding horizontal and vertical forces on the curved surface? Why is the same method not adopted for plane inclined surface that is submerged in a liquid? (2)

(c) A pipe line PQR 200m long is laid on an upward slope of 1 in 50. The length of a portion PQ is 100m and its diameter is 0.20m. At Q the pipe section enlarges to 0.40 m diameter and remains so up to R for a length of 100m. A flow of 80 L is pumped into the pipe at the lower end P and is discharged at the upper end R into a closed tank. The pressure of water at P is 137.34 KN/m². Find the pressure at R and draw H.G. L and T.E.L. Take f = 0.005. (4)

Supplementary examination (February-2019)

Total page No.........1...............

Roll No ....

END SEMESTER EXAMINATION

B.Tech [civil]

3rd SEMESTER

CE - 207

Sub:- ENGINEERING ANALYSIS AND DESIGN

Max. Marks : 50

Time: 3. Hours

Note :-   Answer any ten question. All question are of equal marks. Assume any missing dada suitably.

1. Discuss briefly the classification of surveying based on (1) Purpose (2) Instruments.

2. The fore bearings of the floor lines AB, CD, EF AND GH are, respectively, as under: (i) S 25^0 30′ W (ii) N 30^0 W (iii) S 40^0 30′ W; (iv) N 70^0 45^0 E. Determine the back bearings.

3. Explain the terms: (i) characteristic strength of material (ii) factored loads (iii) characteristic load (iv) limit state method (v) working stress method.

4. Explain (i) under reinforced design (ii) over reinforced design (iii) balanced section design des (iv) limit state of serviceability (v) limit state of collapse.

5. Distinguish between mechanical weathering and chemical weathering.

6. Explain briefly the object of classifying soils for engineering purposes.

7. What are the various surveys to be carried out before planning a highway system for a given area? Explain briefly.

8. Explain with sketches the various factors controlling the alignment of roads.

9. Explain with the help of a diagram the hydrologic cycle.

10. What is run-of ? What are the factors that affect the run-off from a catchment area?

11. What are different types of transport modes. Write their merit and demerit.

12. Define (i) liquid limit (ii) plastic limit (iii) shrinkage limit (iv) void ratio (v) unit weight of material.

13. What is chain surveying? Write instruments used in chain surveying.

FIFTH SEMESTER
SUPPLEMENTRY EXAMINATION

B.TECH. [CIVIL ENGG.]
(FEB. , 2019)

CE301   Analysis of Determinate Structures

Time: 3:00 Hours

Max. Marks: 40

Note: Answer **ALL** questions by selecting **any two parts** from each question.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1   (a) What is a Structure? Write its classification on the basis of dimensions with the help of two examples in each case.

(b) What is Castigliano's first theorem? Determine the slope and deflection at the free end A of a cantilever beam AB of span L carrying uniformly varying load with maximum w/unit length at the fixed end B and zero at the free end using this theorem.

(c) What is Betti's theorem? Also give its derivation.

Q.2   (a) A beam ABC of 5 m length is supported by a hinge at A and a roller support at B. Two supports are at 3 m apart. The beam carries an udl of 12 kN/m on the entire length. Determine shear force, bending moment and location of point of contraflexure. Also draw shear force and bending moment diagrams indicating maximum values.

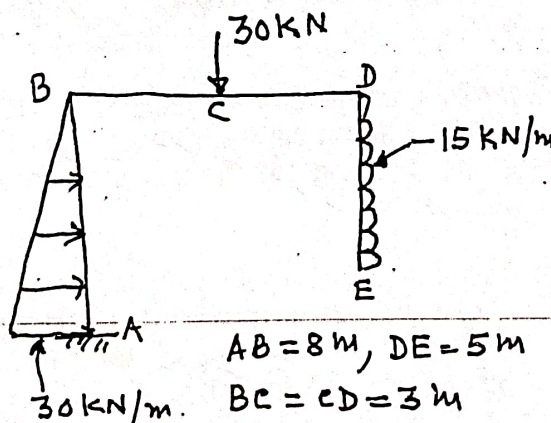(b) Draw axial force, shear force and bending moment diagrams of plane frame shown in Fig.1 indicating maximum values.
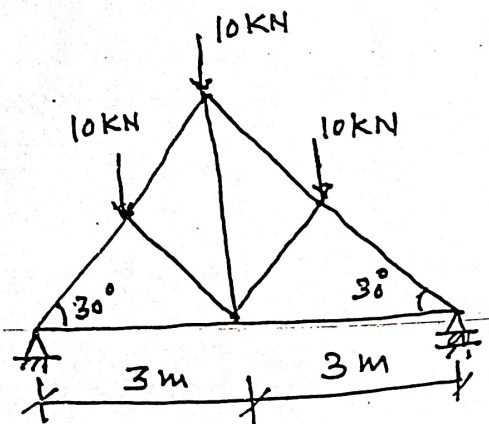

30KN

B ──── D
    C

−15 KN/m

E

AB=8M, DE=5M

30KN/m.   BC = CD=3 M

10 KN

10KN   10KN

30°   3°

3 m   3 m

Fig.1   Fig.2

(c) Determine the forces in all the members of truss shown in Fig.2.

-2-

Q.3 (a) Two point loads of 180 kN and 240 kN spaced at 5 m apart, crosses a girder of 25 m span from left to right with 180 kN leading load. Draw the maximum shear force (negative and positive) and bending moment diagrams indicating the absolute maximum values. Also give calculations.

(b) Draw the influence lines for the reaction at support A, the shear force in panel CD, and the bending moment at D of the girder with floor beam system shown in Fig. 3. Also give calculations.

FIG.3
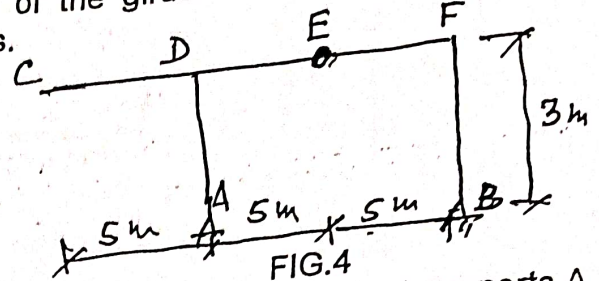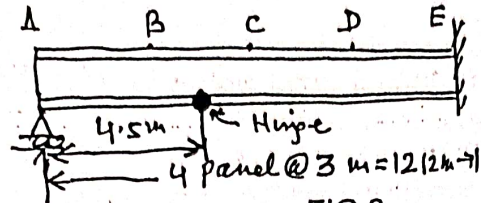
FIG.4

(c) Draw the influence lines for the horizontal and vertical reactions at supports A and B and the shear at hinge E of the frame shown in Fig. 4. Also give calculations.

Q.4 (a) Determine the slope at supports and deflection at the free end of the beam shown in Fig. 5 using Macaulay's method.

Fig.6

Fig.7
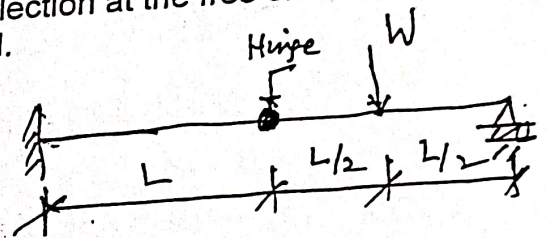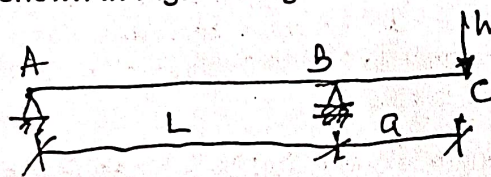
(b) Determine the slope and deflection at the internal hinge B of the beam shown in Fig.6 using Conjugate Beam method.

(c) A basket ball rigid frame AB of height L and horizontal rod BC span L/2 carries a basket board of vertical weight W. Neglecting axial deformations, determine the horizontal and vertical displacements of the board point C using Unit load method. Take EI is constant.

Q.5 (a) A three hinged parabolic arch carries an UDL of 30 kN/m on the left of the span. It has a span of 16 m and a central rise of 3 m. Determine the resultant reactions at supports and bending moment, normal thrust and radial shear at a section 2 m from left support.

(b) Draw the influence line diagram for left support reaction, bending moment, shear force and normal thrust at a section 4m from left support of a three hinged circular arch of span 16 m and a central rise of 4 m indicating maximum values. Also give the calculations.

(c) A hollow circular column section with both end fixed is 12 m long and has an outer diameter of 120 mm with 20 mm wall thickness. Compare the crippling load according to Euler's and Rankine's formulae. Modulus of elasticity (E) for the material is 80 kN/mm² and critical stress, f_c is equal to 550 N/mm².Determine the length at which both the crippling loads are equal. Take Rankine's constant, a = 1/1600.

Total No. of Pages 02

Roll No................

B.Tech. [Civil Engg]

FIFTH SEMESTER

SUPPLEMENTARY EXAMINATION

FEB-2019

PAPER CODE: CE303

TITLE OF PAPER: DESIGN OF R.C.C STRUCTURE

Time: 3:00 Hours

Max. Marks: 40

Note : Answer Any Four Question
IS: 456-2000 are allowed
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1 [a] Design reinforced column of 450x600 mm subjected to an axial load of 2000 kN under service load condition. Unsupported length of column is 3m, use M 25 and Fe 415 grade of steel. Assume column is braced?

[b] A T- beam having an effective flange width of 2500 mm is required to resist an ultimate moment of 1200 kNm. Thickness of flange is 150 mm, width of the beam is 300 mm and the effective depth is 900 mm. using M 15 grade of concrete and Fe 250 grade of steel. Determine the area of reinforcement requirement.

Q.2 [a] A doubly reinforced section beam of overall dimension 250 x 450 mm is reinforced with 4 bars of 25 diameter on the tension side and with 4 bars of 18 mm diameter on the compression side. Effective cover to centre of reinforcement is 50 mm. If the grade of concrete is M 20 and grade of steel is Fe 250. Calculate the ultimate moment capacity of the section.

[b] A simply supported beam is 300 mm wide and 600 mm overall depth is has 2 number of 20 mm Fe 415 grade of steel bar going into support. If the shear force at the centre of support is 120 kN at working loads check safety for bond in this beam assume M 25 grade of concrete and Fe 415 grade of steel.

P.T.O

Q.3 [a] A simply supported normal Tee beam of 5.0 m clear span is loaded with characteristic load of 40 kN/m. It is reinforced with 4 number 25 mm diameter bars at support. The section of the beam is 250 mm wide and 550 mm effective depth. Design the Shear Reinforcement at the support. The materials are M 25 grade concrete and HYSD reinforcement of grade Fe 415.

[b] Design a beam for following moment, Shear force and Torsional moment acting at certain location. B.M = 200 kN-m, S.F = 120 kN and Torsional Moment = 48 kN-m. Use M 25 grade of concrete and Fe 415 grade of steel, width of beam is 400 mm, effective cover is 50 mm.

Q.4 [a] Design a short circular column of diameter 700 mm for a load 5000 kN use helical reinforcement. Using M 25 grade of concrete and Fe 415 grade of steel. Calculate area of steel require and spacing of helical reinforcement. Use clear cover to ties equal to 40 mm.

[b] A simply supported beam of 5 m effective span is subjected to 24 kN/m live load M 20 grade of concrete and Fe 415 grade of steel. The overall depth of the beam is 400 mm and width is 150 mm. Design the reinforcement of the beam if K = 0.138, J = 0.80.

d'/d	0.05	0.10	0.15	0.20
fsc (N/mm²)	355	353	342	329

Q.5 Design a simply supported roof slab for a room 8 m x 3.5 m clear in size if the superimposed load is 5 kN/m². Use M 20 mix and Fe 415 grade steel. (Slab is supported on wall of size 230 mm thick)

END

2

ROLL No.........

FIFTH SEMESTER B.Tech. (CIVIL ENGG)
END SEMESTER EXAMINATION *FEB 2019*
CE-307 ADVANCED GEOTECHNICAL ENGINEERING

Time: 3 Hours

Max. Marks : 40

Note: ATTEMPT ANY FIVE QUESTIONS.ASSUME THE MISSING DATA IF ANY.

1. a. Define double layer. How its thickness is determined. · **(4)**

 b. Explain the fabric study by use of following techniques **(4)**
 (i)SEM analysis (ii) Differential thermal technique

2.a.Discuss pump out method for finding permeability of the soil. **(4)**

 b. What are the factors affecting base-exchange capacity of the soil. Determine the base- exchange capacity of clay if 100gm of dry clay soil absorbs 90 gm of calcium. Find the quantity of H that can be absorbed by 6 m³ of this clay if the bulk density of clay is 19 KN/m³ and water content of the soil is 14%. **(4)**

3.a.Derive the relation for K_u and K_β (permeabilities in m and n directions respectively) in terms of K_h and K_v(permeabilities in horizontal and vertical directions respectively). **(4)**

 b. Discuss how the strength of the soil is improved by electro osmosis process. **(4)**

4.a. How the seepage through zoned dam is estimated. Discuss Pavlosky's solution. **(4)**

 b.Write a note on the seepage in layered soils. **(4)**

4.a. Explain the mechanism of shear strength. **(4)**

 b. The equation of Mohr's envelope is given by $T^2 = \sigma+16$ (kg/cm²).Find the unconfined compressive strength, torsional shear strength and tensile strength . **(4)**

5. a .Differentiate NCC and OCC. Explain how pre consolidation pressure is determined. **(4)**

 b. Explain the concept of sand drain. Discuss the free strain case without smear. **(4)**

6.a.Derive an expression for unconfined compressive strength q_u in terms of C' and φ'. Take B=1 and initial capillary tension =u. Hence deduce the ratio of c_u/p for NC soil, where p is pre consolidation pressure. **(4)**

 b. Discuss consolidated-undrained-and consolidated-drained tests for NCC and OCC. **(4)**

7.a.Discuss Skempton's pore pressure parameters giving the equation and describe it's significance. How these parameters are determined from triaxial test. **(4)**

 b. What is stress path. Explain its applications. **(4)**

Supplementary Examination ———————————————— **Feb-2019**

CE 309: ENVIRONMENTAL ENGINEERING DESIGN

Maximum Marks 50   **Time 3 hours**

Attempt FIVE questions. Attempt at least 2 questions from each section. All questions are of 10 marks.
Make necessary assumptions wherever required and clearly state them.

SECTION A

1. Write explanatory note on any FOUR of the following:
    a. Control of hydrogen sulphide emissions of wastewater treatment plants
    b. Nitrogen control in wastewaters
    c. Corrosion control
    d. Air stripping for ammonia removal from wastewaters
    e. Principle of optimality in deterministic dynamic programing.
    f. Design criteria of aerators.

    (2.5X4=10)

2. An environmental research company has 8 units of money available for exploration of three technologies. For one of the technology to be viable, the probability of finding it depends upon the amount allocated for exploiting the technology, as given below

Units of money	0	1	2	3	4	5	6	7	8
Technology									
1	0	0	.1	.2	.3	.5	.7	.9	1
2	0	.1	.2	.3	.4	.6	.7	.8	1
3	0	.1	.1	.2	.3	.5	.8	.9	1

The probability that the technology 1, 2, 3 is viable is .4, .3, .2 respectively. Find optimal allocation of money.

(10)

3. Solve the following formulated L.P.P.

    MAX. $Z=5X_1-2X_2+3X_3$

    S.T. $2X_1+2X_2-X_3 >=2$

    $3X_1 - 4X_2 <=3$

    $X_2 + 3X_3 <=5$

    All variables in above problem are non-negative.

    (10)

4. Solve the following two variable unconstrained non-linear problem using search procedure :

    $f(x)= 2x_1x_2 + x_2 - x_1^2 - 2x_2^2$

    (10)

SECTION B

5.

a. Write the concept design of Renny wells.

b. An oxidation ditch activated sludge system is to treat 7.5 MLD of municipal wastewater having BOD₅ of 200 mg/l and no primary treatment is provided. The oxidation ditch is 3m deep, 7m wide and 400m long, with MLSS OF 1800 mg/l. The value of Y is determined to be 0.5kg/kg and value of k_d is found to be 0.06 per day. Determine the mean cell residence time if the residual BOD requirement is (1) 10 mg/l (2) 20 mg/l.

(3+7=10)

6.

a. In a Bio-tower type wastewater treatment plant, primary and secondary sludges are mixed and thickened in a gravity thickener and then treated by two stage anaerobic digestion. Draw a flow diagram in schematic form and label the typical characteristics of wastewater and sludge at different stages. Also indicate the approximate size of each unit for a municipal wastewater flow of 10 MLD.

b. Explain the detailed design procedure for Secondary clarification.

(7+3=10)

7.

a. Explain the use of EPANET for discharge distribution and head loss computations

b. Explain the role of mechanical aeration with suitable case study/example along with typical data in (1) water treatment and (2) wastewater treatment.

(3+7=10)

END

Total No. of Pages:02

Roll No........

VII SEMESTER

B.Tech.

SUPPLEMENTARY EXAMINATION

FEB-2019

CE405 Design of Steel Structures

Time: 3:00 Hours

Max. Marks : 40

> Note: Answer any 5 question
> Use of IS 800:2007 is Permitted.
> Assume suitable missing data, if any.

Q.1 a. Name the different modes of failure of a riveted joint?

b. What are the factors that affect strength of Tension member?

c. What is shear lag?

d. When the slenderness ratio of compression member increases, the permissible stress decreases.why? (2x4)

Q.2 Design a built up laced column with four angled to support an axial load of 750 kN. The column is 10m long and both ends are held in position and restrained against rotations. Assume Fe 410 grade steel.

(8)

Q.3 Calculate the strength of a 20 mm dia bolt of grade 4.6 for the following cases. The main plates to be jointed are 12mm thick

a. Lap joint

b. Single cover butt joint, the cover plate being 10 mm thick

c. Double cover butt joint each of the cover plate being 8 mm thick

(8)

Q.4 A simply supported steel joist with a 4.0m effective span carries a udl of 40kN/mover its span inclusive of self weight. The beam is laterally unsupported. Design a suitable section. Take f_y=250N/mm2 .

(8)

P.T.O

Q.5 Design a single angle section for a tension member of a roof truss to carry a factored tensile force of 200 kN. The member is subjected to the possible reversed of stress due to the action of wind. The length of the member is 3m. Use 20 mm shop bolts of grade 4.6 for the connection.

Q.6 Design top plate, bottom plate, stays, upper tier beam of elevated water tank to store 10^5 litres of water?

END

(b) A sequence of inflows (in thousand cumec) for 30 time periods is given below. Prepare a 3x3 inflow transition probability matrix by calculating transition probabilities by discretising the inflows into three intervals 0-2,2-4,4-6 (3)

T	Q_t	T	Q_t	T	Q_t
1	2.4	11	4.8	21	2.6
2	2.3	12	4.1	22	1.3
3	1.5	13	5.5	23	2.4
4	1.1	14	5.9	24	1.6
5	2.1	15	3.2	25	3.4
6	2.4	16	4.3	26	2.6
7	4.2	17	5.3	27	3.5
8	4.6	18	3.2	28	2.6
9	5.1	19	1.2	29	1.4
10	3.2	20	4.6	30	4.5

8[a] A water resources project has benefits that equal Rs 20 million at the end of first year and increase on a uniform gradient series to Rs 100 million at the of fifth year. The benefits remain constant at Rs 100 million each year until the end of the year 30, after which they decrease to zero on a uniform gradient series at the end of year 40. Calculate the present worth of these benefits using 10 percent interest rate. (3)

[b] Using the equivalent annual cost and present worth basis, determine which of the following projects is preferable at 10% interest? (3)

Particulars	Project A	Project B
Capital Cost (in millions of Rs)	50	40
Annual Operation & Maintenance Cost (in millions of Rs)	2	3.6
Salvage Value(in millions of Rs)	7	6
Service life (in years)	30	30

Note : Question One is compulsory. Attempt Two questions from Part A and Three from Part B. Assume suitable missing data, if any.

1   Answer eight parts of the question
[a]   Write a brief note on probable physical, economical and environmental effects to be kept in mind while planning for water resources project.
[b]   Explain the terms: curse of dimensionality, planning horizon and analysis of different un-certainties in water resources.
[c]   Enlist different discounting techniques used for economical analysis of projects. How do you select a suitable discounting rate technique for a given water resources problem?
[d]   Fuzzification of inputs and defuzzification
[e]   Enlist various factors which affect erosion by water. Explain various forms of soil erosion in a catchment due to runoff.
[f]   Write a brief note on land capability based on land slope.
[g]   Compare various structural methods of soil and management.
[h]   Describe the factors influencing rainwater harvesting.
[i]   Write a brief note on non-structural methods of flood management.
[j]   Enlist the utility of stage-discharge curve and flow-duration curve.
[k]   How do you select a suitable unit hydrograph to calculate peak flows for a given catchment area?   (1.5*8)

PART- A

2(a) A rectangular parking lot is 140 m x 280 m long. The time of overlar flow across the pavement to the longitudinal gutter along the centre 18 minutes and the estimated total time of concentration to the dow stream end of the gutter is 24 minutes. The runoff coefficient is 0.9. rainfall of intensity 6 cm /hr falls on the lot for 1 minute and sto abruptly, determine the hydrograph upto its peak magnitude.   (2.

(b) A basin has 415 km² of area L=35 km, LCA=10km. Assuming $C_t = 1.5$ and $C_p = 0.7$, develop a 3 hour synthetic unit hydrograph. (2.5)

3(a) A drainage basin has 160 km² area, 7 hours time of concentration and 9 hours as storage constant with the following information about inter-isochrone area distribution, determine 1 hour unit hydrograph upto its peak value. (2.5)

Time (h)	0-1	1-2	2-3	3-4	4-5	5-6	6-7
Inter isochrones Area (km²)	10	36	22	43	35	10	4

(b) Design a 140 m long bench terrace for a land having an average slope of 18%. The soil is clay loam. The terrace channel has uniform grade 0.5%. Maximum intensity rainfall expected during the 10 years recurrence interval 10 cm/hr. The values of K, x, a and n may be taken as 6.0, 0.22, 0.5 and 0.8 respectively. (2.5)

4(a) During a flood the water surface at a section in a river was found to increase at a rate of 11.5 cm/h. The slope of the river is 1/3300 and the normal discharge for the river stage read from a steady rating curve was 150m³/s. If the velocity of flood wave can be assumed as 2.2 m/s, determine the actual discharge. (2.5)

(b) An unregulated stream provides the following volumes through each successive 4-day period over 40 day duration at a possible reservoir site. What should be reservoir capacity needed to ensure maintaining 75% of the average flow over these 40 days, if the reservoir is full to start with? (2.5)

Day	00	4	8	12	16	20	24	28	32	36	40
Runoff volume(Mm³)	00	10	6	3	4	3	2	1.6	6	16	11

PART- B

5[a] Annual peak flows at a location are known to be exponentially distributed with a mean of 1300 Mm³. Find the peak flow which has an exceedance probability of 0.75. (3)

[b] Using the benefit cost analysis, determine the optimal scale of development for the following alternatives for a small water resources project. Cost and benefits for different alternatives are given in million Rs. (3)

Alternative	1	2	3	4	5	6	7	8
Cost	7	16	35	69	95	127	154	184
Benefits	7	21	48	94	140	180	197	207

6[a] An irrigation project is to be developed. There is 1800 ha-m of water available annually. Two high value speciality crops, A and B are considered for which water consumption requirements are 1 ha-m per ha and 0.75 ha-m per ha respectively. It has also been determined that the planting of more than 400 ha of crop A and 600 ha of crop B would cause an adverse effect on the market for these special crops. It has been estimated that each ha devoted to crop A will result Rs 3lacs profit, while one ha of crop B will net Rs 5 lacs. Solve the problem for optimality. (3)

[b] A river has total available resources of 900 units. The river basin has one reservoir and two more are contemplated. A minimum of 200 units are allocated to existing reservoir. Determine optimal allocation to the three reservoirs with following net benefits (in Million Rs) for different levels of supply from different reservoirs. (3)

Supply (units)	100	200	300	400	500	600	700	800	900
Net benefits for									
Reservoir 1	150	350	500	620	800	850	870	890	900
Reservoir 2	200	400	550	750	890	1000	1050	1090	
Reservoir 3	230	480	600	720	830	940	1000		

7(a) Estimated costs and benefits from an investment on water resources engineering project over a five years period is provided in a table below. The discounting factors at 10% discounting rate are also provided. Calculate the net present value and the benefits ratio of the project. (3)

Year	Costs	Benefits	Net Benefits	Discounting Factors
1	100	----	-100	0.909
2	50	----	-50	0.826
3	---	50	50	0.751
4	---	70	70	0.683
5	---	90	90	0.621

Total No. of Pages 2

IIIRD SEMESTER

SUPPL. EXAMINATION

Roll No... ... .

B.Tech.(Computer Engg.)

(Feb. – 2019)

Paper Code: COE-201

Time: 3:00 Hours

Title of the subject: **Data Structures**

Max. Marks: 40

> **Note:** Answer any five questions. Write pseudo code/C code for all algorithms asked. Assume suitable missing data, if any.

1. (a) Write an algorithm to evaluate a postfix expression.

   (b) Consider two strings $X = x_1, x_2, ... x_m$ and $Y = y_1, y_2, ... y_n$ where x_i, $1 <= i <= m$ and y_i, $1 <= i <= n$ are members of finite set symbols. Write an algorithm to generate a string by taking 1 element from each list. When any one string is exhausted, the output string should store rest of the elements of other string.

   [4,4]

2. Consider a list of numbers: 62, 31, 70, 91, 25, 11, 9, 61, 73, 6

   Write an algorithm to convert this array into a Max-Heap and show the application of the algorithm on given array/list. Show heap construction after every swap operation. [8]

3. Let the key of a node in a binary search tree be X (let's also call this node, "node X"). Please give a definition of inorder Predecessor(X), and inorder Successor(X). Given that you are at node X write algorithm Predecessor(X), and Successor(X). Assume each node is having a parent pointer and root node address is always available. [8]

4. (a) Given two linked lists a and b, each containing n distinct numbers, design two different algorithms (possibly with different efficiency) to determine whether the two lists contains precisely the same set of numbers (but possibly in a different order).

   (b) Write an algorithm to reverse a singly linked list.

   [6,2]

5. A priority queue is a data structure that supports storing a set of values, each of which has an associated key. Each key-value pair is an entry in the priority queue. The basic operations on a priority queue are: insert(k, v): insert value v with key k into the priority queue, removeMin(): return and remove from the priority queue the entry with the smallest key. Write complete implementation of this priority queue. [8]

P.T.O

6. Consider the following acyclic digraph. Assume the adjacency lists are in sorted order: for example, when iterating through the edges pointing from 0, consider the edge 0 → 1 before 0 → 6 or 0 → 7.
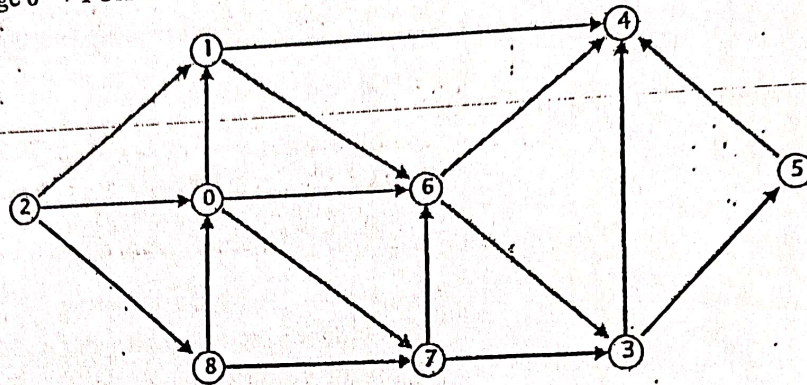
Give topological sorting order for this graph. Also give DFS and BFS output starting from vertex 2. [4+2+2]

7. (a) Explain properties and structure of a B-tree. Draw a B-tree of degree 4 or more having atleast three levels.

(b) Explain BFS graph traversal technique. Write an algorithm for BFS traversal such that along with traversal it also computes single source shortest path for a given unweighted graph. [4,4]

8. (a) Write an algorithm to count number of non-leaf nodes (internal nodes) in a given binary tree.

(b) Write an algorithm to add two polynomials using array of structures. [4,4]

Total no. of pages 2

Roll No:...................

THIRD SEM

B.TECH(CO)

SUPPLYMENTARY EXAMINATION

February 2019

CO-203 OBJECT ORIENTED PROGRAMMING

Time: 3 Hours

Max. Marks : 40

Note : Answer any five questions
Assume suitable missing data, if any.

Q1. (a) Explain constructors and destructors. Give suitable code to explain. 7

(b) What is type conversion? Write suitable code for conversion from class type basic type. 7

Q2. (a) What are the additional keywords added in C++ other than C? Explain 5 keywords of C++. 7

(b) What is the difference between inline function and macros? Write a program using inline function, to find sum of two numbers 7

Q.3 (a) Explain the use of friend function. Give suitable example. 7

(b) What is function overloading? Write a program to overload function **area** using function overloading. 7

Q4. (a) Create a code for exception handling for exception type int, char and float 6

(b) Write a program to add, show details of employee and student using inheritance where class "person" is inherited by two different classes "employee" and "student" 8

Q.5 (a) Give the meaning of the following terms: 9
  i) Abstraction;
  ii) Encapsulation;
  iii) Data hiding.

(b) Explain different visibility modes available in C++ along with their purpose. 5

Q6. (a) What are the rules for function overloading? 5

P.T.O.

(b) How the virtual functions are declared in C++.   6

(c) List operators which can't be overloaded   3

                                            14

Q7. Write short notes on any two :-

   (a) Virtual class

   (b) Templates

   (c) Call by value

   (d) Features of Java

Total No. of Pages: 2

3rd Semester

Supplementary Examination

—78—

Roll No................

B.Tech. (COE)

(February 2019)

CO 205: Discrete Structures

Duration: 3 Hours   **Maximum Marks: 50**

Instructions:

- First question is compulsory. Attempt any two parts from the remaining questions.
- Calculator is allowed.
- Assume missing data suitably (if any).

1. (a) Write the contrapositive, the converse, and the inverse of the following statement.

"A positive integer is a prime only if it has no divisors other than 1 and itself. [2]

  (b) Define strong mathematical induction. [2]

  (c) How many different messages can be represented by sequence of three dashes and two dots? [2]

  (d) Define Boolean algebra with example. [2]

  (e) What is chromatic number of a graph? Briefly explain. [2]

2. (a) Suppose that there are 21 cricket players in the Indian team. Out of the 6 players are taking part in a one-day match, 7 players are taking part in T-match and five players are taking part in both one-day and T-20 matches. H many players are not taking part either in one-day or in T-20 match? [5

  (b) Suppose that in the Hasse diagram of a partially ordered set, a vertex "above" another vertex a, but there is no line from a to c. Can we concl that $a \leq c$? Explain with example. [5

  (c) In a Boolean algebra show that $ab' + a'b = 0$ if and only if $a = b$. [5

3. (a) Use mathematical induction to show that $H_{2^n} \geq 1 + \dfrac{n}{2}$, where

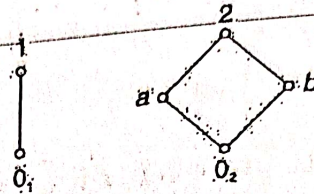$$H_n = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n}.$$

Page

P.T.O

(b) Solve the recurrence relation $a_n - 6a_{n-1} + 9a_{n-2} = 0$, $n \geq 2$, $a_0 = 1, a_1 = 9$. [5]

(c) Let $f(n) = 5f\left(\dfrac{n}{2}\right) + 3$ and $f(1) = 7$. Find $f(2^k)$ where k is a positive integer. Also, estimate $f(n)$ if f is an increasing function. [5]
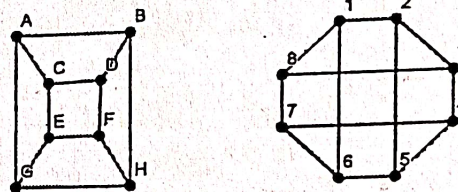
4. (a) Let $(L_1, *, +)$ and $(L_2, \wedge, \vee)$ be two lattices. Define the direct product $L_1 \times L_2$ and find the direct product of the lattices given below. [5]

(b) Define a partially ordered set. Check whether $(P(X), \subseteq)$ is a chain where X is a set and $P(X)$ is the power set of X. [5]

(c) In a distributive lattice, show that
$$(a * b) \oplus (b * c) \oplus (c * a) = (a \oplus b) * (b \oplus c) * (c \oplus a).$$ [5]

5. (a) Define graph isomorphism. Are the following two graphs isomorphic?

[5]

(b) Prove that a Tree with n vertices has n-1 edges. [5]

(c) Define spanning tree and prove that a graph is connected if and only if it has a spanning tree. [5]

~All the best~

Total No. Of Pages 2

THIRD SEMESTER
SUPPLEMENTARY EXAMINATION

Roll no....................

B.TECH (CO)
February 2019

CO207 SIMULATION AND MODELLING
(ENGINEERING ANALYSIS AND DESIGN)

Time 3:00 hours

Max. Marks: 50

> **Note: Attempt any five questions. All Questions Carry Equal Marks.**
> **Assume suitable missing data ,if any:**

Q1. Records pertaining to the monthly number of jobs related injuries at an underground coalmine were being studied by a federal agency. The values of past 100 months were as follows:

Injuries per month	0	1	2	3	4	5	6
Frequency of Occurrence	35	40	13	6	4	1	1

Apply the chi-square test to these data to test the hypothesis that the underlying distribution is Poisson. Calculate the parameter mean and use in the equation. Use $\chi^2_{0.05,5} = 11.1$ (10)

Q.2 a) Explain the flow diagram for the execution of arrival and departure events. (5)
b) Calculate the mean and variance of exponential distribution. (5)

Q.3 How to simulate a single-server queueing system by showing how its simulation model would be represented inside the computer at time $e_0 = 0$ and the times e_1, e_2, ...e_9 at which the 8 successive events occur that are needed to observe the desired number, n = 4, of delays in queue. Assume the interarrival and service times of customers are
$A_1 = 0.4$, $A_2 = 1.2$, $A_3 = 0.5$, $A_4 = 1.7$, $A_5 = 0.2$, $A_6 = 1.6$, $A_7 = 0.2$, ...
$S_1 = 2.0$, $S_2 = 0.7$, $S_3 = 0.2$, $S_4 = 1.1$, $S_5 = 3.7$, $S_6 = 0.6$, ... (10)

Q.4 a) Customers at a restaurant arrive in groups (one to eight persons). The number of persons (per group) and the relative frequencies appear as below. Draw the empirical CDF and PDF. (5)

Arrivals per party	1	2	3	4	5	6	7	8
Frequency	40	100	40	76	15	10	8	11

P.T.O

b) Dr X is a dentist who schedules all his patients for 30 minutes appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and time actually needed to complete the work.

Category of service	Filling	Crown	Cleaning	Extraction	Checkup
Time Required (in mins)	40	60	15	45	15
Probability of category	0.40	0.15	0.15	0.10	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients. Assume that all the patients shown up at the clinic at exactly their scheduled arrival time starting at 8:00 A.M. Use the following random numbers for handling the above problem: (5)
40, 82, 11, 34, 25, 66, 17, 79.

Q.5 a) Discuss the Queue Behaviour in a Queueing system. (3)

b) 60% of the assembled ink-jet printers are rejected at the inspection station. Find the probability that the first acceptable inkjet printer is the third one inspected. Also find the probability that the third printer inspected is the second acceptable printer? (3)

c) Given the mean and variance for a binomial distribution are 5 and 5/4 respectively. Find P(X>=1). (4)

Q.6 a) Suggest a step by step procedure to generate random variates using inverse transform technique for triangular distribution. (5)

b) Explain the various components used in Discrete Event Simulation Models. (5)

END

Total No. of Pages 2   Roll No. ......

THIRD SEMESTER   **B.Tech. [COE/SE/IT]**

SUPPLEMENTARY EXAMINATION   *Feb-2019*

COE/SE/IT -261 ANALOG ELECTRONICS

Time: 3:00 Hours   Max. Marks : 40

> **Note : Question number 1 is compulsory.** Answer any **Four questions** from the rest. Assume suitable missing data, if any. All abbreviations have their usual meaning.

Q1. (a) If the emitter current of a transistor is 10 mA and the base current is 1/100 of collector current, determine the values of small-signal model parameters g_m and r_π of the transistor.   2

(b) Find the drain voltage for a fixed bias JFET circuit having V_{GS} = -3V, assuming I_{DSS}= 10mA, V_P = -5V, V_{DD}= 15V and R_D = 5KΩ?   2

(c) Explain the Barkhausen criterion of sustained oscillation.   2

(d) Determine the gain desensitivity factor for a feedback amplifier having open loop gain A =10^4 and closed loop gain A_f =10^3.   2

Q2. (a) For the circuit shown in Fig. 1 determine the value of V_C and I_E if β_F = 100.   4
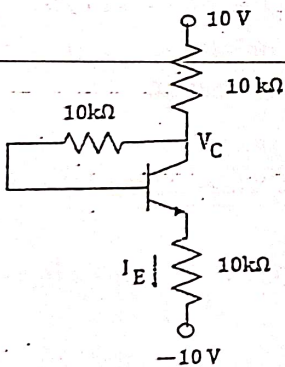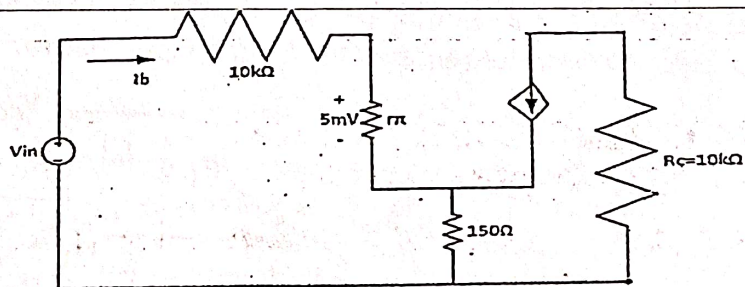

Fig. 1   Fig. 2

(b) Analyze the circuit shown in Fig-2 and determine the input voltage (V_{in}) if the bias current I_{CQ} = 0.5 mA and β_F = β_0 =100.   4

Q3. (a) An enhancement type NMOSFET with V_t =2V, has its source terminal grounded and a 3V DC source connected to gate. Determine the region of operation of the device for V_D= 1V and the value of drain current if $\mu_n C_{ox}$ =20 μA/V² and W/L =100μm/10 μm.   3

Contd—2

(b) Drawing the small signal circuit of CG amplifier determine the voltage gain, and input resistance of the amplifier   5

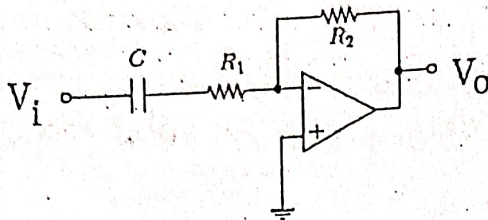Q4. (a) Deduce the expression for input resistance for a shunt-shunt feedback amplifier.   3
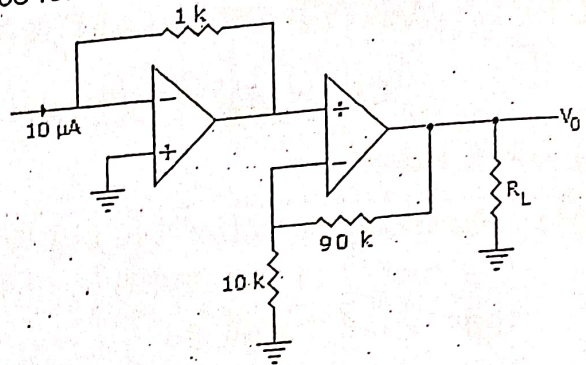

Fig. 3

Fig. 4

(b) Derive the transfer function (V_0/V_i) for the circuit shown in Fig. 3.   3
(c) For the circuit shown in Fig. 4 determine the value of output voltage V_0.   2

Q5. (a) An enhancement type NMOSFET with $V_t = 2V$, has its source terminal grounded and a 3V DC source connected to gate. Determine the region of operation of the device for $V_D = 1V$ and the value of drain current if $\mu_n C_{ox} = 20$ $\mu A/V^2$ and W/L = 100 $\mu m/10$ μm.   3

(b) Drawing the small signal circuit of CG amplifier determine the voltage gain, and input resistance of the amplifier   5

Q6. For the transistor amplifier shown in Fig. 5 assume $R_1 = 16$ kΩ, $R_2 = 9$ kΩ, $R_C = 1$kΩ, and $R_E = 100$ Ω, $V_{CC} = 2.5V$ and $\beta_F = \beta_0 = 100$.

(a) Determine the Q point and identify the region-of-operation of transistor.   4
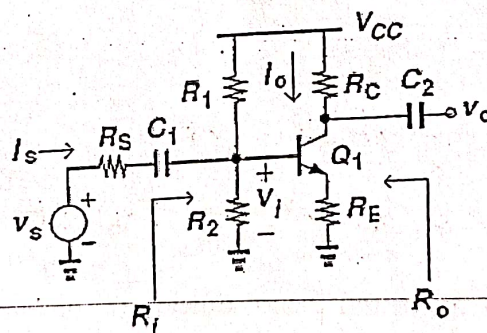(b) Determine voltage gain (V_0/V_s) and input resistance (R_i) for the amplifier.   4

Fig.5

1(a)

or an NMOSFET with $L = 0.18 \mu m$, $W = 2 \mu m$, $C_{ox} = 0.2$

$C_{ox} = 8.6 fF/\mu m^2$, $\mu_n = 450 cm^2/V\text{-}s$, $V_t = 0.5 V$.

Find. V_{GS} & V_{DS} that results in NMOSFET operating at the edge of saturation with $I_D = 100 \mu A$.

5(b). Common drain

Drawing the small signal circuit of CD amplifier determi
the voltage gain and input resistance of the amplier.

Q(5)(a)

For an NMOSFET with $L = 0.18 \mu m$, $W = 2 \mu m$, $C_{ox} = 0.2$

$C_{ox} = 8.6 fF/\mu m^2$, $\mu_n = 450 cm^2/V\text{-}s$, $V_t = 0.5 V$.

Find. V_{GS} & V_{DS} that results in NMOSFET operating at the edge of. saturation with $I_D = 100 \mu A$.

5(b) Common drain

Drawing the small signal circuit of CD amplifier determi
the voltage gain and input resistance of the amplier.

Total No. of Pages 02   Roll No. ....
FIFTH SEMESTER   B.Tech. (COE)

SUPPLEMENTARY EXAMINATION   FEB.-2019

CO-305 INFORMATION THEORY & CODING

Time: 3:00 Hours   Max. Marks: 50

> **Note:** Answer Any FIVE questions. All questions carry equal marks.
> Assume suitable missing data, if any.

1[a] A coin is tossed an odd number of times. If the probability of getting more heads than tails in these tosses is equal to the probability of getting more tails than heads then show that the coin is unbiased.

[b] Find the discrete entropy for the source with symbol probabilities {0.3, 0.25, 0.2, 0.15, 0.1}.

2[a] Given $xi = \{x1, x2, x3, x4, x5, x6\}$ with probabilities $p(xi) = \{0.3, 0.25, 0.2, 0.12, 0.08, 0.05\}$. Make Huffman code. Find efficiency of this code.

[b] Derive the relationship between entropy and mutual information.

3[a] Define (i) Discrete entropy H (X) and joint entropy H (X,Y) and
(ii) Mutual information I(X;Y).

[b] Define and Explain the following:-
i) Source coding Theorem.   ii) Convolution Code.

4 [a] Find the generator and parity check matrices of a (7, 4) cyclic code with generator polynomial $g (X) = 1 + X + X3$.

[b] Define channel capacity. Difference between binary symmetric and Asymmetric channel.

5 [a] State Shannon-Hartley theorem and from that derive Shannon's theoretical limit.

[b] Determine the capacity of a channel of infinite bandwidth.

6 [a] Prove that the entropy for a discrete source is maximum when the output symbols are equally probable.
[b] Explain how to generate a linear block code using G-matrix. Explain with an example

7 Write short note **Any Two**:-
[a] Kraft; and Mc Millan's inequality.
[b] Prefix coding with suitable Example.
[c] Briefly describe the steps of Viterbi algorithm.

CO-327 MACHINE LEARNING

Time: 3:00 Hours   Max Marks: 40

NOTE: Answer any FIVE questions. Assume suitable missing data, if any.

Q1. Answer all the following questions:

[a] Consider the problem of sorting 'n' numbers. Is it wise to apply machine learning to solve this problem? Justify your answer.

[b] Illustrate difference between hard margin and soft margin SVM.

[c] Give two real life examples of unsupervised learning.

[d] Write the applications of reinforcement learning.   [4 X 2=8]

Q2.[a] Machine learning algorithms are used for model prediction. How do we build model using machine learning algorithms. Explain stepwise procedure with schematic diagram.   [4]

[b] You are given the project for faculty appraisal in university based on academics as well as research records. Analyse and suggest the various dependent and independent attributes which could be present in the training data provided by the university. Categorize the variables according to their type.   [4]

Q3 [a] Consider the following dataset. Construct a decision tree using information gain as attribute selection measure.   [4]

Price	Maintenance	Capacity	Airbag	Profitable
Low	Low	2	No	Yes
Low	Med	4	Yes	No
Low	Low	4	No	Yes
Low	High	4	No	No
Med	Med	4	No	No
Med	Med.	4	Yes	Yes
Med	High	2	Yes	No
Med	High	5	No	Yes
High	Med	4	Yes	Yes
High	High	2	Yes	No
High	High	5	Yes	Yes

[b] Explain splitting of decision tree based on different types of attributes with suitable examples. Also, tell the significance of Occam's Razor in decision trees.   [4]

P.T.O

Q4. [a] Compute eigenvalues and eigenvectors for given 2 X 2 matrix.

$$\begin{bmatrix} 5 & -3 \\ -6 & 2 \end{bmatrix}$$

How do you retrieve the original data from principal components in PCA method?

[4]

[b] Explain taxonomy of dimensionality reduction methods used in machine learning. Briefly differentiate between wrapper classes and filter classes. [4]

Q5. [a] What is need of Reinforcement learning? Compare supervised machine learning and Reinforcement learning. Also highlight the challenges that we face in reinforcement learning. [4]

[b] Differentiate between leave one out and hold out cross validation with the help of an example. [4]

Q6. [a] Take the following training samples

X	Y	Z	Fruit
4	6	7	Apple
2	4	9	Mango
4	2	4	Orange
5	5	7	Apple
4	3	9	Orange

Predict the label of test sample (X, Y, Z) =(3, 9, 3) with the KNN classifier (K=3) using Manhattan distance.

[4]

[b] Explain role of prior probability, likelihood, evidence, Bayes rule and posterior probability in Naïve Bayes classifiers.

[4]

Q7. [a] Performance analysis of classifier is better practice. Do you agree with this statement? What can be the different performance evaluation metrics for any classifier? Explain their significance and how do you calculate them? [4]

[b] How do you deal with multicollinearity and imbalanced data issue in machine learning?

[4]

CO 357 OPERATING SYSTEM

Time: 3:00 Hours   Max. Marks: 50

Note: Answer ANY 5 Questions. Question No. 1 is compulsory.
Assume missing data if any.

Q1. Answer all the following questions: [10]
(a) Mention the objectives and functions of an operating system.
(b) List the steps needed for page replacement.
(c) Explain the difference between internal and external fragmentation.
(d) What are the various file accessing methods?
(e) Discuss the Safe, unsafe, and deadlock state spaces.

Q2. Answer all the following questions:
(a) Explain the operating system structure and its functions   [5]
(b) Describe the features of a distributed operating system.   [5]

Q3. Answer all the following questions:
(a) Differences between preemptive scheduling and non preemptive Scheduling
                                                                     [5]

(b) Describe the differences among short-term, medium-term, and long term
Schedulers.   [5]

Q4. Answer all the following questions:
(a) Give a solution for readers-writers problem using conditional critical regions?
                                                                     [5]

(b) Write Peterson Algorithm for 2-process synchronization to critical section
problem and discuss briefly.   [5]

Q5. Answer all the following questions:
(a) Consider the reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1
for a memory with three frames. Trace FIFO, optimal, and LRU page replacement
algorithms.   [5]

P·T·O

(b) Discuss in detail about various page table structures. [5]

Q6. Answer all the following questions:

(a) Define the term Virtual memory. Give memory partition of 100K ,500K, 200K, 300K and 600K (in order).How would each of the first fit, best fit and worst fit algorithm place process of 212 K, 417 K, 112K, and 426 K(in order)? Which algorithm makes the most efficient use of memory? [5]

(b) A system has 6 processes sharing 'n' resources where 4 processes need at most 7 resources and other 2 processes need at most 5 resources. If the system is deadlock free, what is the min value of 'n'? [5]

Q7. Answer all the following questions:

(a) Consider a disk system with 100 cylinders. The requests to access the cylinder occur in the following sequence:

5, 35, 11, 8, 20, 38, 3, 16, 7, and 21.

Assuming that the head is currently at cylinders 50, what is the time taken to satisfy all requests if it takes 1 millisecond to move from one cylinder to adjacent one and SSTF (shortest seek time first) and FCFS (first come first serve) policy is used. [5]

(b) What do you understand by thrashing and its solution? Explain. [5]

-END-

Total no. of Pages: 02

Roll no...........

Supplementary Exam

Feb-2019

Fifth Semester

B.Tech.OEC

CO361 Database Management System

Duration: 3 Hrs.

Max Marks: 50

NOTE: Attempt all the questions. Assume the missing data if any.

(2.5x4)

Q1.Given the relational schemas:

ENROLL(s#, c#, section) – s# represents student number

    TEACH (prof, c#, section) – c# represents course number

    ADVISE (prof, s#) – prof is thesis advisor of s#

    PRE_REQ(c#, pre_c#) – pre_c# is prerequisite course

    GRADES (s#, c#, grade, year)

    STUDENT(s#, sname) – sname is student name

Give queries expressed in relational algebra and tuple calculus for the following queries:

a) List all students taking courses with Smith or Jones.

b) List all students taking at least one course that their advisor teaches.

c) List those professors who teach more than one section of the same course.

d) List the courses that student 'John' can enroll, i.e. has passed the necessary pre_requisite courses but not the course itself.

Q2.(a) Explain the normal forms due to functional dependencies.

(4)

(b) Draw an ER diagram for a garment manufacturing company. The entity includes warehouses, production units, marking wing, vendor and product types. Define the relationship between each of these entities and take the attributes so that they can define a particular entity property.

(6)

P.T.O.

Q3. a) List the ACID properties. (2)

b) Explain generalization and serialization with suitable example.
(3)

c) Compare Natural join with Outer join with suitable example.
(5)

Q4. a) Explain the use of Checkpoints in recovery scheme. (2)

b) Differentiate between a serial schedule and serializable schedule.
(3)

c) What is time stamp? Discuss the working of wait -die and wound-wait transaction.
(5)

Q5. Explain the following terms: (4x2.5=10)

a) Fourth Normal form

b) Derived attributes

c) Triggers

d) Indexing

END

Total No. of Pages 2
3rd SEMESTER
SUPPLEMENTARY EXAMINATION

Roll No.........................
B.Tech. (CSE)
Feb-2019

SE203 Object Oriented Programming

Time: 3:00 Hours

Max. Marks: 40

Note: Answer any five question. Question No. 1 is compulsory. Assume suitable missing data, if any.

Q1. Answer all the following questions: [12]

(a) Compare the OOP Language and structured programming language

(b) Define constructor and give example

(c) What is Abstract class? Explain

(d) List the operators which are not possible to overload.

(e) How to protect the data with private inheritance?

(f) Explain the guidelines for defining template.

Q2. Answer all the following questions: [3, 4]

(a) Give the structure of a C++ Program.

(b) Demonstrate encapsulation and polymorphism.

Q3. Answer all the following questions: [3,4]

(a) Explain about scope resolution operator?

(b) Illustrate the dynamic initialization of objects for long term fixed deposit system program.

Q4. Answer all the following questions: [3, 4]

(a) Distinguish between call by value and call by address with an example

(b) Write a program to exchange values between two classes using friend classes

Q5. Answer all the following questions: [3, 4]

(a) Explain two ways of converting an object of one class to an object of another?

(b) Differentiate between derived constructor and base constructor.

P.T.O

Q6. Describe the three different inheritance behaviors achieved through the use of pure virtual, ordinary virtual and non virtual functions? [7]

Q7. Answer all the following questions: [3, 4]
(a) Write a c++ Program to add two integers, two floats and two complex numbers using class templates.
- (b) Explain about the sequential and random access file operations

-END-

Total No. of Pages: 02

Roll No. ... .

B. Tech. (SE)

Third Semester

Supplementary Examination

(Feb 2019)

SE-205 WEB TECHNOLOGY

Time: 3hrs

Max. Marks: 50

> **Note:** *Question No. 1 is compulsory. Answer any 4 from the rest.*
> *Assume suitable missing data if any.*

(2x5=10)

Q1.Differentiate between the following: -
   a) Push protocol and Pull protocol
   b) Social Web and Semantic Web
   c) Webpage and Web-App
   d) Persistent HTTP and Non-persistent HTTP
   e) Precision and Recall

Q2. a) What is the "Service" view of Internet? Explain any two services in detail with the Internet protocols used in it. (5)
   b) Which hierarchical application layer service acts as a phone book for mapping URLs to IP addresses? (5)

Q3. a) Create an html page containing 5 style tags. (5)
   b) Write a JavaScript program to implement an odd/even number check. (5)

Q4. a) How is an index created in a typical Web IR system? (5)

OR

Define Sentiment Analysis task tuple. Why machine-learning based techniques are preferred over the lexicon-based techniques? (5)

b) How is ranking done in a typical Search Engine? What do you understand by the intrinsic "filtering" measure, TF-IDF? (5)

Q5. a) Describe the evolution of Web and the challenges associated with Web (5)

b) Write short-notes on any *two*: (2x2.5=5)
(i) Server-side Technologies
(ii) Request message in HTTP
(iii) Advantages & Disadvantages of Cascading Style Sheets.
(iv) Built-in functions in JavaScript

Q6. a) Fetching something over the network is both slow and expensive. What can be done to improve the Quality of Service (QoS) of the web servers? (5)

b) What is User Profile Modeling in Contextual IR? (5)

OR

What is the MVC architecture of Web development? Describe the same for a sample Django application. (5)

Total No. of Pages:2

Roll No..............

V SEMESTER

B.Tech.[SE]

SUPPLEMENTARY EXAMINATION

Feburary-2019

SE301   **Object Oriented Software Engineering**

Time: 3:00 Hours

Max. Marks:40

Note: Attempt any **Five** questions. Assume suitable missing data, if any.

Q.1 [a] Differentiate the following:

(i) Object oriented analysis and structured analysis.   [2]

(ii) Centralized and de-centralized structure in sequence diagram.   [2]

[b] Explain various methodologies for the development of object oriented software system?   [4]

Q2 [a] For a construction company a software is to be developed with the following specifications:

Company takes many projects, each project is at a particular location. Each project is supervised by a manager assigned by the CEO of the company. Record is maintained for the start of the project till its completion. Under each manager there is a team of people of different category. Each project is marketed by the team of marketing managers.

(i)   Identify the use cases and the actors.

(ii)   Draw the use case diagram and write the use case description of any one use case.   [4]

[b] What is extreme programming? Explain various steps involved in extreme programming.   [4]

Q3. Identify various classes, relationships and draw the class diagram for problem given in Q2[a].   [8]

Q4.[a] Draw a use case scenario diagram for any use case of problem given in Q2[a]. Also, derive a test case matrix from the above use case scenario diagram.   [4]

[b] Consider process of withdrawing money from the ATM machine. Write the sequence diagram for this process.   [4]

P.T.O

Q.5 [a] What do you understand by state based testing? Explain the alpha an omega states with the help of an example?

[b] Explain the steps to that need to carry out during the object oriented des process.

Q6. Consider an example of queue where two operations (insert and delete) allowed. There are four events namely new, insert, delete and destroy with t following purposes:

New: To create an empty queue.

Insert: To add an element in the queue.

Delete: To remove an element from the queue.

Destroy: To destroy the queue after completion of its requirements.

Identify the states and draw the state chart diagram.

Q7.[a] The project is to design and implement an online book store. The store will have following users: the buyer, the administrator, and a data operator. Some of the processes are login, search books, payment, manage and so on. Draw the activity diagram to buy books.

[b] "Testing is not related to only one phase of the software development lit cycle". Comment on the correctness of this statement.

***************************END***************************

Total No. of Pages:2

Roll No..........

Vth SEMESTER

B.Tech(SE)

**SUPPLEMENTARY EXAMINATION**

(Feb– 2019)

Paper Code: SE-303

Title: Algorithm Design and Analysis

Time: 3:00 Hours

Max. Marks: 50

Note: 1. Attempt any 5 questions where question No. 1 is compulsory.
2. Assume any suitable value(s) for missing data.
3. If asked to write algorithms, write as C functions or in pseudo code.

1. (a) Explain activity selection problem using greedy approach with suitable exampie? [2]
   (b) Using divide and conquer approach find the k-th smallest element from an unsorted array using linear time algorithm. [2]
   (c) Solve the following recurrence relation [2]
   (i) $T(n) = 16T(n/4) + n^{3.5}$ [2]
   (ii) $T(n) = 20T(n/4) + n^{1.5}$ [2]

   (d) Consider a weighted complete graph G on the vertex set $\{v1, v2, vn\}$ such that the weight of the edge (vi, vj) is $|i-j|$. Find the weight of a minimum spanning tree of G is? [2]

2. What do you mean by dynamic programming (DP) approach List the features supported by problems in order to apply dynamic programming. Solve longest common sequence (LCS) problem using DP by writing suitable recurrence relation and example? [2+2+2+4=10]

3. Write the Bellman Ford algorithm for single source shortest path problem and by using this algorithm find the shortest path to all vertices for the given weighted graph assuming vertex A as source. [10]
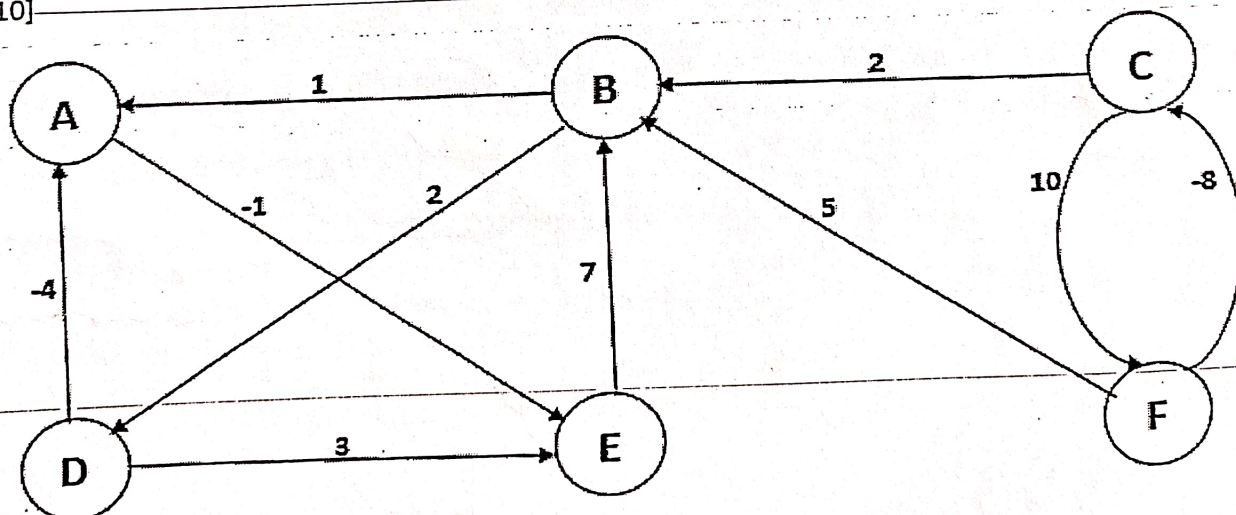
Q 4 (a) Apply Kruskal's algorithm to find MST for given graph and prove solution obtained is optimal. [7]
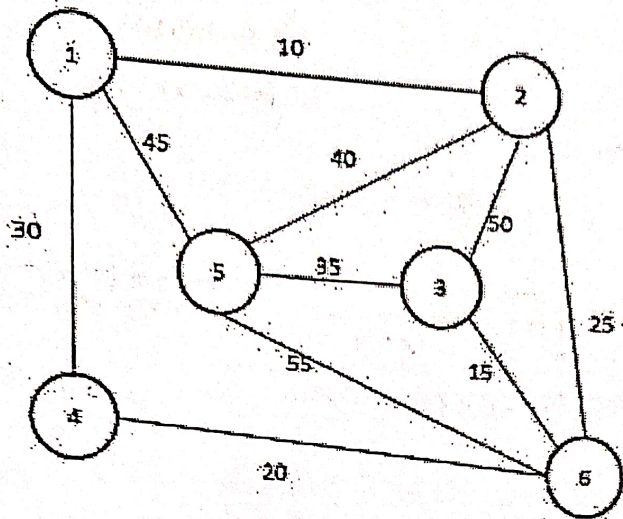
(b) Write the pseudo code to solve knapsack problem using greedy approach and find its time complexity. [3]

5(a) How backtracking techniques are used to solve various problems? Explain how Subset sum problems can be solved using backtracking. [5]

(b) Write down the pseudo code for randomized quick sort and find its time complexity in worst case? [5]

6(a) What do you mean by NP complete and NP hard problems? Give examples for each. Prove that Vertex cover problem is a NP complete problem. [3+3=6]

6 (b) What do you mean heap data structure? Propose best algorithm to find 7th largest element in a max heap of n-elements and give its time complexity [1+3=4]

Total No. of Pages 01

Roll No. ……

SEVEN SEMESTER

B.Tech. (SE)

SUPPLEMENTRY EXAMINATION

FEB-2019

SE407 COMPUTER NETWORK

Time: 3:00 Hours

Max. Marks: 40

> **Note:** Answer ANY FIVE questions. All questions carry equal marks.
> Assume suitable missing data, if any.

1. [a] Describe Hamming code in detail.

[b] The data string is 10011001000010011101. What remainder should be append to message if the cyclic code polynomial used is $x^3 + 1$.

2. [a] Explain sliding window protocol and when it gives 100% efficiency and what is efficiency of stop and wait protocol.

[b] What do you mean by Manchester encoding for signaling standard?

3. [a] A selective repeat ARQ is using 7 bits to represent the sequence number . What is the maximum size of the sliding window ?

[b] Explain how TCP perform congestion control based on three phases namely slow start ,congestion avoidance and congestion detection.

4. [a] Draw and explain header format of Ethernet IEEE 802.3.

[b] Difference between IPv4 and IPv6 and how IPv6 provide connection oriented services.

5. [a] Explain Subnetting in IP address explain with example.

[b] The following is a dump of UDP header in hexadecimal format.
CB84000D001C001C
a) what is source port number. (in hexadecimal)
b) what is destination port number (in decimal)
c) what is total length of the user datagram.(in Bytes)
d) what is the length of the data.(in Bytes)

6. Write short notes on (any 2):-
[a] FTP & SMTP   [b] HTTP & POP3   [c] IPv4 Address

Total No. of Pages 1

SECOND SEMESTER — I

SUPPLEMENTARY EXAMINATION

EE-101 BASIC ELECTRICAL ENGINEERING

Max. Marks: 40

Time: 3 Hours

Note : Attempt any FIVE questions in All. All questions carry equal marks.

Q.1(a) Explain the characteristics of

    (i) Ideal and Practical voltage source   (4)

    (ii) Ideal and Practical current source

(b) Reduce the following network shown in Fig.1 to the simplest form which consists of only single voltage source using source transformation technique.   (4)
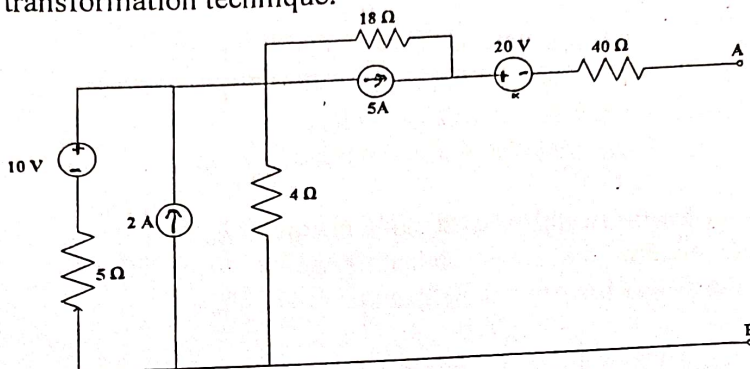
Fig. 1

Q.2 (a) Obtain the expression of equivalent resistances in delta(Δ)of a given star (Y) connected resistances. (4)

    (b) State Maximum Power Transfer theorem and illustrate with the help of an example. (4)

Q.3 (a) State Superposition theorem. Explain its advantages and limitations. (4)

    (b) Determine the Thevenin equivalent circuit as seen from terminals cd for the circuit shown in Fig. 2. (4)
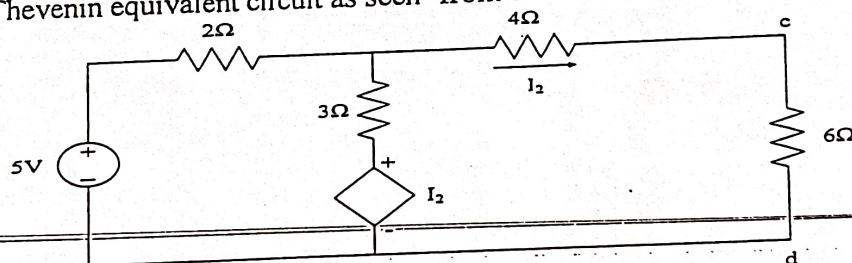

Fig. 2

Q.4(a) How is the effective value determined for nonsinusoidal waveform? Determine the rms value of a resultant current in a wire carrying simultaneously a direct current of 10A and a sinusoidal current of peak value of 10 A. (4)

    (b) A series circuit consists of 1200 Ω resistor, a 1.0 H coil, and a capacitor C. Determine the value of C and the bandwidth of the circuit if the resonant frequency is 4 kHz. (4)

Q.5 (a) Explain with phasor diagram the measurement of the power and pf of a balanced three phase load with the help of two wattmeter method. (4)

    (b) A 400 V, 3 phase supply is connected across a balanced network of three impedances each consisting of a 32 Ω resistance and 24 Ω inductive reactance. Determine the line current and power factor when the impedances are connected in delta. Draw the phasor diagram showing phase voltages, line voltages and currents. (4)

Q.6 (a) Draw the analogy between electric and magnetic circuits. State and explain Kirchhoff's laws for magnetic circuits. (4)

    (b) What are the various losses in a transformer? Explain with the help of circuit diagram the tests needed to determine these losses. (4)

Q. 7   Write short notes on *any two* of the following: (4x2)

    (i)   Shunt and multipliers for instruments   (ii) Autotransformer

    (iii)   PMMC instruments   (iv) Digital Voltmeter

Total No. of Pages: 01

B.Tech. (ECE)

Supplementary Examination

╼702╼

Roll No.............

Third Semester

Feb-2019

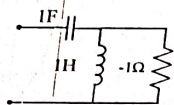## EE-251: ELECTRONIC INSTRUMENTATION AND MEASUREMENTS

Time: 03 hours

Max. Marks: 40

Note: All Questions are compulsory.
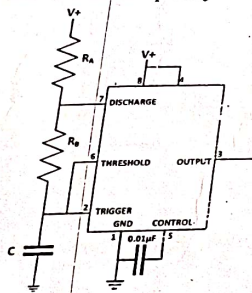Assume suitable missing data, if any.

1. [a] Explain precision and sensitivity. [4]
   [b] A component manufacturer constructs certain resistors to be anywhere between 1.14kΩ and 1.26 kΩ and classifies them as 1.2kΩ resistors. What tolerance should be stated? [4]

2. [a] Explain diagram, principle of operation and working of a Wheatstone bridge. Calculate the value of unknown resistance. [6]
   [b] Write and explain the general equation for balance of the ac bridge. [2]

3. Explain the structure and working of IEEE-488/GPIB. [8]

4. Explain the construction and working of CRO. [8]

5. Explain the working of a photodiode as a photovoltaic device and a photoconductive device. [8]

-END-

EE-313 LINEAR INTEGRATED CIRCUIT

Note:	Answer **any EIGHT** questions.
	All questions carry equal marks
	Assume suitable value for missing data (if any).

1[a] Determine the voltage V_o for the circuit shown below.

[b] An opamp that is powered from a ± 5V supply is used to build a non-inverting amplifier having a gain of 10. The slew rate of the opamp is 0.5×10^6 V/s. For a sinusoidal input with amplitude of 0.2V, determine the maximum frequency (in kHz) up to which it can be operated without any distortion.

2 [a] The circuit shown below uses ideal opamps. Find out the current I (in μA) drawn from the source V_s.
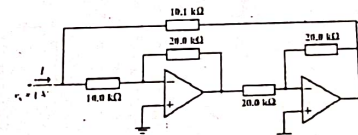
[b] Determine the input impedance of the circuit shown below.

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9   Draw the circuit diagram of an RC-phase shift oscillator realized with an opamp and three identical RC sections. Also determine the frequency of oscillation and the required condition of oscillation.

10   Analyze the following circuit which utilizes the 8-pin timer IC 555 to realize a pulse output with a duty cycle which is more than 50 percent. Draw the output waveform as well as the capacitor voltage and therefrom develop an expression for the frequency of the output waveform.

Write short notes on any two of the following:

(a) Ideal op-amp characteristic
(b) Realization of astable multivibrator using an OP-amp IC
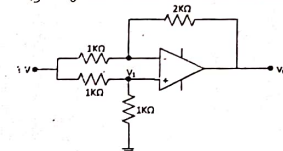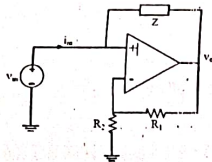(c) Operational transconductance amplifier
(d) Wilson current mirror.

3 For the circuit shown below determine the value of the currents I_{1-4}. The emitter areas of different transistors are scaled in terms of the basic area 'e'. The beta of NPN transistors is equal to 200 while its value for PNP transistors may be taken as 50.
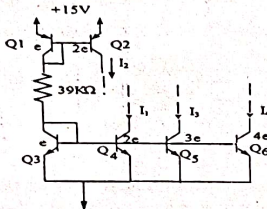
4 For the circuit shown below Determine Z_{in}. Also draw the passive equivalent of this impedance.
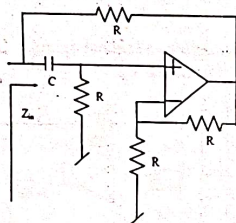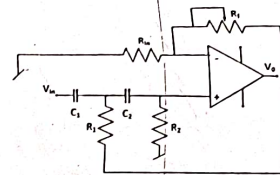

5 Find the transfer function of the circuit shown below and hence identify the type of filter realized by the circuit. Also determine the value of the pole frequency and the quality factor of the poles when $R_1 = R_2 = R$ and $C_1 = C_2 = C$.

6 Identify the different components of the feedback loop present in the amplifier circuit given below and determine the closed loop gain and I/O impedance. You may neglect the channel length modulation effect but include the loading effect of the feedback circuit on the forward path element.
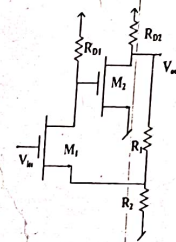
7 For the circuit shown below show that (at room temperature) $V_0 = (1.0)log_{10}\frac{V_2 R_1}{V_1 R_2}$
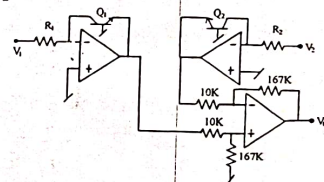
8 Draw the opamp based realization of the following passive circuit.

Total No. of Pages: 1

7th Semester

Supplementary Examination

Paper Code: EE-359

Time : 3:00 Hrs.

Roll No..................

B. Tech. (EE...)

Feb.- 2019

Subject: Non conventional energy systems

Max. Marks: 70

Note: Attempt any five questions. Each question carries equal marks. Assume suitable missing data if any.

1. Discuss the viable energy options to meet the growing energy demand of India, keeping the socio-economic-environmental consideration in mind.

2. a. Draw the block diagram of a typical solar photovoltaic system and discuss the working of its each component.
   b. Calculate the maximum efficiency and 'fill factor' of solar cell having intensity of 1 kW/m². Measurements show open-circuit voltage of 10 V, short-circuit current of 2 A, and the maximum current is 50% of short-circuit current. Assume the 17% efficiency of solar cell.

3. a. Differentiate between battery and fuel-cell. Give the complete description of the working and constructional features of hydrogen-oxygen fuel-cell.
   b. Discuss the different technologies to produce biogas. Also discuss the factors affecting the production of biogas.

4. a. Discuss the aerodynamic operation of wind turbine using drag and lift forces. Why the wind output power is cubic function of wind velocity and maximum theoretical efficiency is only 59.3%.
   b. Discuss the working and control of variable speed wind turbine incorporating maximum power point tracking (MPPT) with the help of any standard MPPT technique.

5. a. Explain the working principle of tidal as well as OTEC power plant with the help of their schematic diagrams.
   b. A simple single-basin type power plant has a basin area of 22 km². The tide has range of 10 m. The turbine stops its operation when the head on it falls below 3 m. Calculate the average power generated during one filling/emptying process in MW if the turbine-generator efficiency is 74%. Take the sea water density as 1025 kg/m³.

6. Write short note on any two
   a. MHD Power plant
   b. Geothermal energy
   c. Role of power electronics in harvesting renewable energy.

B.Tech Electrical Engg. & Electrical & Electronics Engg. *7th SEMESTER*
SUPPLEMENTARY EXAMINATION *(Feb-2019)*
EE -405-Digital Signal Processing
Time: 3:00 Hours *Maximum Marks:40*

Note: Q.1 & Q.2 are compulsory, answer any 3 other questions from the remaining
Assume suitable missing data, if any
Attempt all parts of a question at one place (*Marks may not be awarded otherwise*)

1 [a] Find the step response of the system whose impulse response is: 2

$$h(n) = (1/3)^n$$

[b] Investigate the BIBO stability of system whose impulse response is:
$h(n) = 2^n u(5-n)$ 2

[c] The signal $x(t)=10\cos(10\pi t)$ is sampled @8 samples/sec. Plot the amplitude spectrum for $|\Omega|\leq 30\pi$ (*both in continuous time and sampled mode*). Investigate whether the original signal can be recovered from samples? 4

2 [a] The input to a causal LTI system is:
$x[n] = u[-n-1]+(1/2)^n u[n]$; the z transform of the output of the system is:

$$Y[z]= \frac{-\frac{1}{2}z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)(1+z^{-1})}$$

Determine H[z], the z-transform of the impulse response and y[n]. 4

[b] Consider the following system function:

$$H[z]=\frac{z}{\left(z-\frac{1}{4}\right)\left(z+\frac{1}{4}\right)\left(z-\frac{1}{2}\right)}$$

For the different possible ROC, determine the causality, stability and the impulse response of the system. 4

3 Draw neat diagrams of direct structure-I, direct structure-II for DSP implementation of PID controller. Write their implementing difference equations for both the forms and compare the structure on count of time delays, multipliers, summing junctions and signal distribution points. Modify the equations to realize the structure as transposed form. 8

4 [a] Through timing diagram (*SoC/EoC*) demonstrate the interfacing of A/D converter with DSP. Explain the auto-sequencing feature of A/D converter and briefly discuss the application to two closed loop (*DC voltage & Current loop*) control of a grid connected voltage source inverter by appropriately programming the CHSELSEQ$_n$ registers and MAXCONV register. 4

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[b] Explain the modes of operation of GP timers of F2407 DSP through ne
timing diagrams. Briefly discuss their role for generation of PWM sign
for inverter and converter systems.

5 Using bilinear transformation design IIR Butterworth Low Pass Filter w
3dB attenuation at a frequency of 2000 rad/sec and 14dB attenuation at 48
rad/sec. The sampling frequency is 1kHz. Develop the IIR structure for dire
structure-II realization.

6 Devise a scheme for closed speed control of BLDC motor. The PWM contr
of the inverter is realized through PWM timer. Draw a neat block diagram
the scheme employing F2407 DSP showing the sensed parameters (curre
and speed) of the system. Use PI controller (Rectangular approximation) f
current estimation based on speed error. List out the different modules of t
algorithm, and draw a neat detailed flowchart of the algorithm. Initialize
the F2407 DSP registers of the units utilized, to realize the PWM frequen
of 10kHz, when CPU is clocking @150MHz. Use interrupts to configure t
real time loop and for sampling the data.

Total No. of Pages 03
Third Semester
EndSemester (Supplementary) Examination
Time: 3 Hours

Roll No........
B. Tech(EL/EE)
Feb-2019
Maximum Marks: 40

EE/EL-203 ELECTRONIC DEVICES AND CIRCUITS

Note: Question 1 is **compulsory.**
Attempt **Eight** more Questions.
Assume suitable value for missing data (if any).

1   Fill up the blanks with suitable answers
   (i)   The input impedance of an ideal voltage amplifier should be
             ....
   (ii)   Bandwidth of an ideal transresistance amplifier should be
             ....
   (iii)   A voltage gain of 120 dB when expressed as a dimensionless
             quantity is equal to ....
   (iv)   For a silicon pn-junction having reverse saturation current of
             30 nA at 300 K with a V_T of 26 mV the forward bias required
             to produce a current of 0.1 mA and 10 mA respectively, will
             be............ and ....
   (v)   In the forward active mode of operation of a BJT the
             collector-base junction is ...... biased.
   (vi)   The dynamic resistance r_d of a forward biased diode depends
             on....................
   (vii)   The terminal voltage in a npn transistor were measured and
             found as V_E = -2.7V, V_B = -2.0V and V_C = 0V. The transistor
             is operating in ....mode.

2[a]   What is the current through the diode
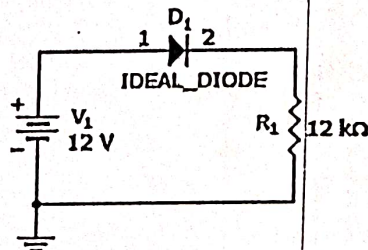
[10] Assuming $V_{IN} = V_P \sin\omega t$ plot the output waveform of the circuit shown below for an initial capacitor voltage of 0.3V across the capacitor.
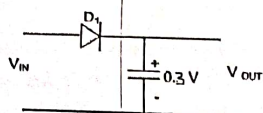
3 Plot the input/output characteristics of the circuit shown below assuming the constant voltage model of the diode.

4 A centre tap full wave rectifier has the load resistance $R_L = 1K\Omega$. The forward resistance R_F of each diode is 10Ω. The voltage across half of secondary winding is given by the equation $v = 200 \sin 314t$. Determine:
   a) The peak and average value of current
   b) The rms value of current
   c) The ripple factor
   d) The rectification efficiency

5 Compute the input impedance of the circuit given below. Take V_A to be infinite.
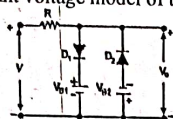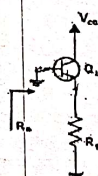

6 Draw the small signal model of the circuit below and determine its voltage gain and output impedance.
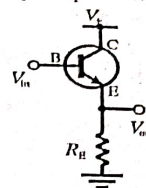
7 Draw the circuit diagram of a common source amplifier along with the biasing diagram (fixed-bias) and derive expression for its voltage gain, input and output resistance

8 Draw the circuit diagram of a BJT differential amplifier loaded with passive resistors and biased with a constant current source. Using small signal model and the concept of half circuits determine the common mode gain, and differential mode input resistance.

9 For the following feedback configurations draw the schematic diagram and compute the input and output impedance:
   (i)   Voltage-current
   (ii)   Current-Current

10 Derive the expression to study the effect of C_S, C_C and C_E on the low frequency response of a common base npn transistor in a fixed biased configuration

11 Write short notes on any TWO of the following:

   (i) Enhancement and Depletion type MOSFET

   (ii) Avalanche and Zener breakdown

   (iii) Properties of negative feedback

END

THIRD SEMESTER
SUPPLEMENTARY EXAMINATION

—110—

EE/EL-205 Electromechanical Energy Conversion and Transformers
Time: 3:00 Hours

Max. Marks: 40

> **Note:** Answer **ALL EIGHT** questions. All carry equal marks. Use graph paper if necessary. Assume suitable missing data, if any.

Q (1) Consider the solenoid shown in Fig.1. Let the coil have a resistance R and be excited by a voltage $v = V_m \sin \omega t$. For a displacement g_0 between the plunger and the coil (pole face), determine the steady state (i) coil current (ii) electric force

Core thickness (into the paper) = a
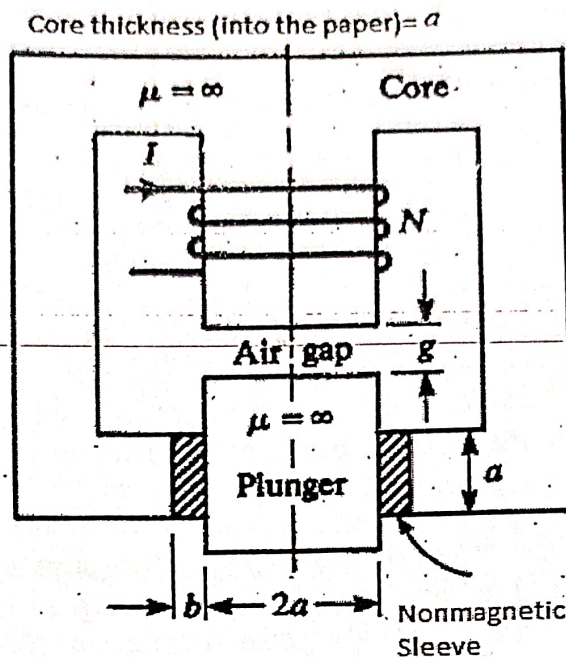
Fig. 1

Q(2) List out any eight differences between Lap and Wave Winding. Prepare the winding table for the Lap winding for the following parameters: Number of slots s= 16, Number of poles 2p= 4, Number of parallel paths 2a= 4, Number of coil sides in upper layer of a slot u= 1, Number of turns per coil N_c=1.

Q(3) A 60-kW, 960-rpm, 230-V, 260.2-A DC generator operates as a separately-excited generator at nominal speed and nominal voltage feeding an external circuit with such resistance that the current drawn by the load is equal to the nominal armature current. Resistances of winding at steady temperature and nominal operation are: armature winding resistance $R_a = 0.035\Omega$ and resistance of inter pole winding $R_{int} = 0.015\Omega$. The brush voltage drop is $\Delta V_{BR} = 2\,V$. Assuming constant field excitation current, find the armature terminal voltage, current and delivered power to the external load for the speed of prime mover decreases 15%.

Q(4) Derive the EMF equation for a generator from basic operating principles. The two plots of Fig.2 show the **OCC** for a **600-V**, 1200 rpm dc machine where the data were recorded at 1200 and 800 rpm. Explain how if only one of the curves were available, the second could be generated.

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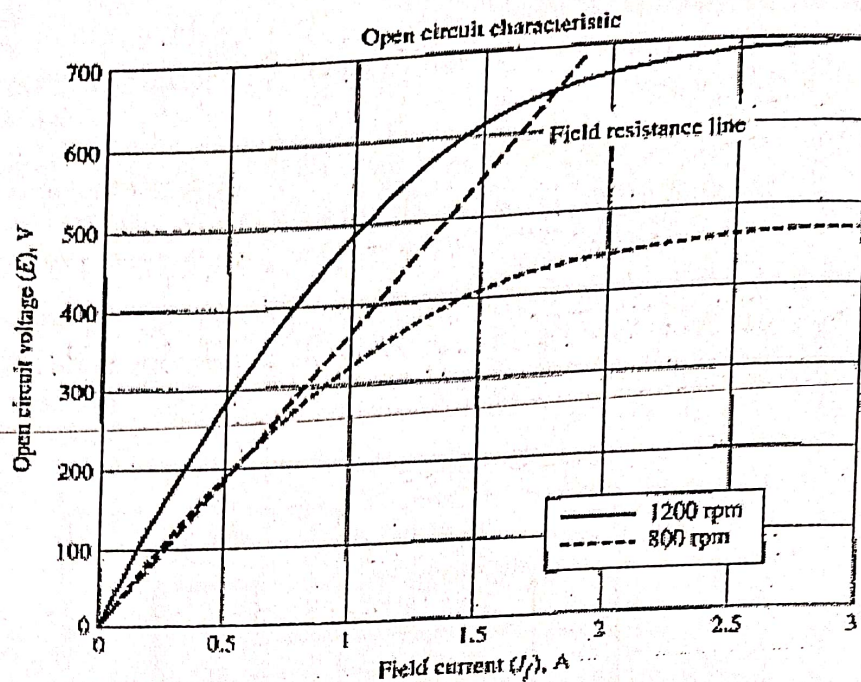
Fig. 2

Q(5) Discuss the method of speed control of a dc shunt motor. A 10-hp, 230V shunt motor takes a full load line current of 40A. The armature and field resistances are 0.25 Ω and 230 Ω respectively. The total brush contact drop is 2V and the core and friction losses are 380W. Calculate the efficiency of the motor. Assume that the stray load losses is 1% of output.

Q(6) Draw and explain the vector diagram of a single phase transformer supplying with a (i) lagging load (ii) leading load . The following 60-Hz data were recorded for a 480:240-V, 25-kVA, 60-Hz transformer with windings and core at approximately normal operating temperatures: In addition, the dc resistances of the two windings were measured and the values found to be $R_{1dc} = 0.110\Omega$ and $R_{2dc} = 0.029\Omega$. Determine the values of the equivalent circuit elements.

Test	Voltage (V)	Current (A)	Power (W)
OC test (Low side)	240	9.7	720
SC test (High side)	37.2	51.9	750

Q(7) Draw the vector diagrams and winding connections of vector group 2 for Y_{y6}, D_{d6}, D_{z6}. A three phase step down transformer is connected to 6.6 kV supply mains and takes 80A. Calculate its secondary line voltage and line current for the Y-Δ if the ratio of turns per phase is 16.

Q(8) Draw the vector diagram of an auto transformer operating on unity power factor load. An auto transformer is used to step-down voltage level from 230V to 200V. While the load is 20kW at UPF, neglecting the losses and magnetizing current, find the current in different sections of the winding.

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Total no. of pages :1

III SEMESTER

Roll No._____

EE/EL Supplementary Exam

Feb-2019

EE/EL-207 Engineering Analysis and Design

Time : 3 hours

Max. Marks: 40

Note: *Answer any five questions. Assume suitable missing data, if any. Symbols used have their usual meanings*

Q1. Answer the following questions briefly

a) Develop a MATLAB program to compute sum of series 1,3,5, …. upto 100 terms. Also compute the mean and the mean deviation in the code.

b) Create a function to convert temperature in Kelvin to Fahrenheit. Call the function and get user input and print output also. (2x4=8)

Q2.

a) Use Euler method to solve $y' = x+y$, h=0.2, y(0)=0; compute y at x=0.8.

b) Develop a program to compute impedance and power factor using user inputs such as frequency, resistance, inductance and capacitance value for a series RLC circuit. (2x4=8)

Q3.

a) Using RK4 technique. show the solution for the differential equation: $dy/dx = (x+y)\sin(xy)$, y(0)=5 after the first iteration, taking h=0.2

b) Show how differential equations can be solved using RK2, RK4; clearly highlight the difference in their accuracy and mathematical complexity. (2x4=8)

Q4.

a) What is Trapezoidal rule. Use it to calculate integral of $f(x) = \sin(x)$ between the limits 0 and π taking 12 steps. Also compute the error between the estimated value and the actual value and interpret your results.

b) Solve using Newton Raphson method to compute the root of the function $f(x) = e^{-x} - x$ given initial guess =0, x_0=0. (2x4=8)

Q5.

a) Solve the system of equations given below using a suitable method:
$x_1^2 + x_1 x_2 = 10$ and $x_2 + 3x_1 x_2^2 = 57$ Assume initial guess is (1,2)

b) Develop a Simulink model to represent the differential equation $79v'' - 9v' + 0.4v + 3.14 = 0$. Assume v,v' are outputs to be observed, (2x4=8)

Q6.

a) Find transfer function for computing the voltage across a capacitor for a series RLC circuit, when the input is (i) constant voltage (ii) a sine wave.

b) Discuss the analogy between mechanical and electrical systems giving suitable examples. (2x4=8)

V Semester EE/EL   B.Tech

Supplementary Examination   February – 2019

EL/EE-301 Power Electronics

Time: 3:00 Hours   Max. Marks: 40

Note: Question **No. 1 is compulsory.** Attempt **any four** from the **remaining questions.**
Assume suitable missing data, if any.

Q.1 Answer in brief: -
(a) Draw the symbol and VI characteristics of the GTO.   [1]

(b) Why doesn't IGBT exhibit secondary break-down phenomenon?   [1]

(c) Why is high interdigitation of the gate design preferred in GTO?   [1]

(d) Draw the thermal equivalent circuit of SCR and list the various parameters [1] involved in it.

(e) A single phase voltage controller is connected to a load of resistance 10Ω and a [1] supply of $200 \sin 314t$ volts. Find the average thyristor current for a firing angle of $\frac{\pi}{2}$

(f) Why is the switching frequency of MOSFET higher than that of other semi- [1] conductor devices?

(g) A single phase full wave mid-point thyristor converter uses a 230/200 V [1] transformer with centre tap on the secondary side. Find the peak inverse voltage of the thyristor.

(h) What are the effects of high $\frac{dv}{dt}$ and high $\frac{di}{dt}$ on an SCR?   [1]

Q.2 (a) Describe various types of power diodes indicating clearly the differences amongst [4] them.

(b) Draw the switching characteristics of a thyristor during its' turn-on and turn-off [4] processes. Show the variation of voltage across the thyristor and the current through it during switching and also indicate the various time intervals of turn-on and turn-off times.

Q.3 (a) A single phase full converter is supplied from a 230V, 50Hz source. The load [4] consists of R=10Ω and a large inductance so as to render the load current constant. For a firing angle of 30°, determine:
   (i) average output voltage and average output current.
   (ii) average thyristor current and rms thyristor current.

(b) Describe the operating principle of a single phase to single phase step up cyclo-converter with the help of a bridge configuration. Also draw the appropriate circuit and wave forms.

Q.4 (a) A single phase semi-converter feeds power to RLE load. Draw the source voltage, output voltage, load current, source current and free-wheeling diode current waveforms as a function of time when the extinction angle $\beta > \pi$.

(b) Explain how the step up chopper can be used for regenerative breaking of motors with suitable circuit diagram and waveforms.

Q.5 (a) A three − phase full converter is operated from a three − phase star connected 208V, 60Hz supply and the load resistance is R=10Ω. If it is required to obtain an average output voltage of 50% of the maximum possible output voltage, calculate: -

  (i) The firing delay angle α.
  (ii) The rms and average output currents.
  (iii) The rms and average thyristor currents.
  (iv) The rectification efficiency.

(b) A Type A chopper feeds power to an RLE load with R=2Ω, L=10mH and E=6V. If this chopper is operating at a chopping frequency of 1kHz and duty cycle of 10% from a 220V DC source, compute the maximum and minimum currents drawn by the load.

Q.6 (a) Determine the Fourier Series expression for the output voltage and current obtained from a single phase half bridge inverter.

(b) A single phase voltage controller feeds power to a resistive load of 3Ω from 230V, 50Hz source. Calculate: -

  (i) The maximum values of average and rms thyristor current for any firing angle.
  (ii) The minimum circuit turn off time for any firing angle α.
  (iii) The ratio of third harmonic voltage to fundamental voltage for $\alpha = \dfrac{\pi}{3}$

Q.7 (a) Discuss the principle of working of a three-phase bridge inverter using appropriate circuit diagram. Draw the phase and line voltage wave forms on assumption that each thyristor conducts for 180° and the resistive load is star connected.

(b) For a single pulse modulation used in inverters with pulse width $= 2d$, show that the output voltage can be expressed as

$$v_0 = \sum_{\alpha=1,3,5}^{\infty} \frac{4V_s}{n\pi} \cdot \sin\frac{n\pi}{2} \cdot \sin nd \cdot \sin n\omega t$$

Total No. of Pages..............   Roll No..........................
FIFTH SEMESTER   B.TECH. EE/EL
SUPPLEMENTARY EXAMINATION   Feb,2019

EE/EL 303 POWER TRANSMISSION AND DISTRIBUTION

Time: 3 Hours   Max. Marks : 40

Note : Answer any eight questions. All questions carry
equal marks. Assume suitable missing data, if any.

1. a) Draw the single line diagram for transmission and distribution system. What are the advantages of using HVAC system.
2. Derive expressions for the inductance per phase per meter of a 3-phase line with
   (i)   equilateral spacing
   (ii) unsymmetrical spacing. Assume transposition in (ii).
3. What is the percentage saving in feeder copper if the line voltage in a two wire dc system be raised from 110 V to 250V for the same power transmitted?
4. A three phase 50Hz transmission line 120Km long delivers 10 MW at 0.8 pf lag at 66KV .The impedance and admittance of the line is $(0.1+j0.3)$ ohms/phase/km of $0+j0.04 \times 10^{-4}$ S/phase/km respectively. Calculate (a) the sending end voltage (b) sending end current (c) efficiency of transmission. Use nominal T method.
5. Explain Ferranti effect with the help of phasor diagram.
6. Derive an expression for sag and tension in a power conductor strung between two supports at equal heights considering wind and ice loading effect.
7. A 33kV, 3-phase underground cable, 4km long, uses three single cables. Each of the conductors has a diameter of 2.5cm and the radial thickness of insulation is 0.5cm. The relative permittivity of the dielectric is 3.0. Determine
   (a) Capacitance of the cable/phase.
   (b) Charging current/phase.
8. In a 3-phase overhead line, each conductor has a diameter of 30mm and are arranged in the form of an equilateral triangle. Assuming fair weather conditions, air density factor of 0.95 and

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irregularity factor 0.95, find the minimum spacing between the conductors if the critical disruptive voltage is not to exceed 230kV between lines. Breakdown strength of air may be assumed to be 30kV per cm(peak).

9. A string of suspension insulators consists of four units. The capacitance between each link pin and earth is one-tenth of the self capacitance of a unit. The voltage between the line conductor and earth is 100kv Find voltage distribution across each unit

10. Explain in detail the following(any two)
   (i)   Methods to improve string efficiency of the insulators.
   (ii) Surge diverters.
   (iii) Capacitance grading of cables.

Note: Q.1 to Q.6 are compulsory.
Attempt any two questions from Q.7 to Q.10.
Assume any data if missing and clearly mention the assumption.

Q.1 a) Let x(t) and y(t) be given as shown in Fig.1(a) below. Sketch the [2] following signals:
1) x(2t) y(0.5t+1)
2) x(t) y(-1-t)
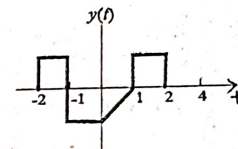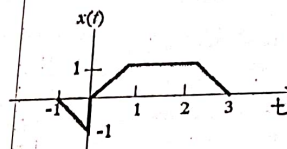
b) Consider a periodic signal x(t)   [2]
$$x(t) = \begin{cases} 1, & 0 \le t \le 1 \\ -2, & 1 < t < 2 \end{cases}$$

With period T=2. The derivative of this signal is related to the "impulse train" g(t).

$$g(t) = \sum_{k=-\infty}^{\infty} \delta(t - 2k)$$

With period T=2. It can be shown that

$$\frac{dx(t)}{dx} = Ag(t - t_1) + Bg(t - t_2)$$

Determine the values of A, B, t_1, t_2

What are the constraints placed on the real and imaginary parts of β if the region of convergence (ROC) of the Laplace transform of x(t) which is X(s) is Re{s}> -3

Q.9 a) The system function of a causal LTI system is: [5]
$$H(s) = \frac{s + 1}{s^2 + 2s + 2}$$
Determine the response y(t) when the input $x(t) = e^{-|t|}$

b) Find the inverse Z-transform of X(z)   [5]
$$X(z) = \frac{z^{-1}}{3 - 4z^{-1} + z^{-z}} ; ROC; |z| > 1$$

Q.10 a) Consider an LTI system for which the input and output satisfy the [5] linear constant-coefficient difference equation:
$$y[n] - 0.5y[n - 1] = x[n] + \frac{1}{3}x[n - 1]$$
Determine the impulse response

b) A Differentiator is a continues time LTI system function   [5]
$$H_C(s) = s$$
A discrete-time LTI system is constructed by replacing s in the above function by the following known bilinear transformation:
$$s = \frac{1 - z^{-1}}{1 + z^{-1}} * \frac{2}{T_s}$$

Find the frequency response of the discrete-time system and plot its magnitude and phase responses.

ALL THE BEST

Q.2 a) Sketch the following signals:

1) x[n-2] + y[n+2] [2]
2) x[3-n] y[n]

x[n] and y[n] are as follows

$$x[n] = \{3,2,1,0,1,2,3\}$$
$$y[n] = \{-1,-1,-1,-1,0,1,1,1,1\}$$

*Assume 0 value as your reference, at t=0{x[n]=y[n]=0}

b) Consider a system S with input x[n] and output y[n]. This system is [2] obtained through a series interconnection of a system S_1 followed by S_2. The input-output relationships are as follows:

S_1: $y_1[n] = 2x_1[n] + 4x_1[n-1]$
S_2: $y_2[n] = x_2[n-2] + 0.5 \, x_2[n-3]$

Where $x_1[n]$, $x_2[n]$ denote input signals.

1) Determine the input-output relationship for system S
2) Does the input-output relationship of system S change if the order in which S_1 & S_2 are connected in series is reversed.

Q.3 a) Evaluate the continues-time convolution integral: [3]
$$y(t) = \cos(2\pi t)\,(u(t+1) - u(t-1)) * e^{-t}u(t)$$

b) Determine and sketch the convolution of the following two signals: [3]

$$x(t) = \begin{cases} t+1, & 0 \leq t \leq 1 \\ 2-t, & 1 < t \leq 2 \\ 0, & elsewhere \end{cases}$$

$$h(t) = \delta(t+2) + 2\delta(t+1)$$

Q.4 a) Consider the signal: [3]

$$x[n] = \alpha^n u[n]$$

1) Sketch the signal g[n]=x[n]- α x[n-1].
2) Use the result of part (1) in conjuction with the properties of convolution in order to determine a sequence h[n] such that
$$x[n] * h[n] = 0.5^n\{u[n+2] - u[n-2]\}$$

b) Evaluate the following discrete-time convolution sum: [3]
$$y[n] = (u[n+10] - 2u[n] + u[n-4]) * u[n-2]$$

Q.5 A system may or may not be: [5]
(1) Time Invariant
(2) Causal

Determine which of these properties hold and which do not hold for each of the following continues/discrete time signals. Justify your answers.

a) y(t)=x(t-4)+ x(4-t)
b) y(t)=Odd{x(t)}
c) y[n]=x[n-2]-2x[-n-8]
d) y[n]=Even{x[n-1]}
e) y(t)=x(sint)

Q.6 a) A single-phase full bridge ac to dc converter is used to feed a **highly** [2] **inductive Load.** Draw the equivalent circuit diagram of the given scenario with SCR as your switch. Determine the Fourier series of the **supply current** obtained. (Assuming the firing angle as zero degrees and input voltage one cycle to be from 0 to 360 degrees)

b) Consider a continues-time LTI system whose frequency response is [2]
$$H(j\omega) = \int_{-\infty}^{\infty} h(t)e^{-j\omega t}dt = \frac{\sin(4\omega)}{\omega}$$
If the input to this system is a periodic signal x(t),
$$x(t) = \begin{cases} 1, & 0 \leq t < 4 \\ -1, & 4 \leq t < 8 \end{cases}$$
With period T=8, Determine the corresponding system output y(t)

c) Determine DTFS coefficient of the signal x[n] and also plot the [1] magnitude and phase spectrum of DTFS coefficient.
$$x[n] = \cos(\frac{\pi n}{3} + \emptyset)$$

Q.7 a) Find the impulse response of a system with the frequency response [5]
$$H(j\omega) = \frac{(sin^2(3\omega))\cos\omega}{\omega^2}$$

b) Find the Z-transform and ROC of the signal: [5]
$$x[n] = 2\left(\frac{5}{6}\right)^n u(-n-1) + 3\left(\frac{1}{2}\right)^n u(n)$$

Q.8 a) Determine the Nyquist rate of the following signals: [5]
1) $x(t) = 1 + \cos(2000\pi t) + \sin(4000t)$
2) $x(t) = (\frac{\sin(4000\pi t)}{\pi t})^2$

b) Consider the signal [5]
$$x(t) = e^{-5t}u(t) + e^{-\beta t}u(t)$$

SUPPL. EXAMINATION

Feb *2019*

EE/EL315 DIGITAL CONTROL & STATE VARIABLE ANALYSIS

Time: 3:00 Hours   *Max. Marks :50*

Note: Attempt any five questions. All questions carry equal marks.
Assume suitable missing data, if any.

1 [a] Obtain the state space (State Model) representation for armature controlled DC
motor.   (5)

1 [b] A system is described by the following differential equation. Represent the
system in phase variable form: (5)

$$\frac{d^3x(t)}{dt^3} + 3\frac{d^2x(t)}{dt^2} + 4\frac{dx(t)}{dt} + 4x(t) = u_1(t) + 4u_2(t) + 6u_3(t)$$

Outputs are

$$y_1(t) = 4\frac{dx(t)}{dt} + 3u_1(t)$$

$$y_2(t) = \frac{d^2x(t)}{dt^2} + 4u_2(t) + u_3(t)$$

2 [a] Solve the difference equation   (5)

$$c(k+2) + 3c(k+1) + 2c(k) = u(k);\ c(0) = 1$$
$$c(k) = 0\ for\ k < 0.$$

2 [b] Discuss the need of sampler and zero order hold devices. Also discuss the
sampled data control system with the help of neat diagrams.   (5)

3 [a] For a system represented by the state equation   (5)
$\dot{X}(t)=AX(t)$

the response of

$X(t)=\begin{bmatrix} e^{-2t} \\ -2e^{-2t} \end{bmatrix}$ when $X(0)=\begin{bmatrix} 1 \\ -2 \end{bmatrix}$

And

$X(t)=\begin{bmatrix} e^{-t} \\ -e^{-t} \end{bmatrix}$ when $X(0)=\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

Determine the system matrix A and state transition matrix.

3[b] Find the transfer function from the data given below for continuous system.

(5)

$$A = \begin{bmatrix} -3 & 1 \\ 0 & -1 \end{bmatrix}, B = \begin{bmatrix} 1 \\ 1 \end{bmatrix}, C = \begin{bmatrix} 1 & 1 \end{bmatrix}, D = 0$$

4 [a] Check the stability of the following characteristic equation using Jury's stability test.

(5)

$$Z^4 - 1.7Z^3 + 1.04Z^2 - 0.268Z + 0.024 = 0$$

[b] Discuss the advantages of state variable theory over the classical control theory.

(5)

5 [a]. Obtain the STM of the following system

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix}$$

(5)

5[b]. Determine the stability of the following characteristic equation using Bilinear Transformation.

(5)

$$Z^3 - 0.2Z^2 - 0.25Z + 0.05 = 0$$

6 A discrete time system is described by state equation

(2.5×4)

$$y(k+2) + 5y(k+1) + 6y(k) = u(k)$$
$$y(0) = y(1) = 0; T = 1 \ sec.$$

(a) Determine the state model in canonical form
(b) Find state transition matrix
(c) Determine the state model in phase variable form
(d) For input u(k)=1 for k≥0, find output y(k).

7 Consider the dynamics of a non-homogeneous system as

$$\begin{bmatrix} \dot{x}_1(t) \\ \dot{x}_2(t) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

where u(t) is the unit step function occurring at t =0.

$$y(t) = [1 \ 0]X(t)$$

and the initial condition $X(0) = [1 \ 0]^T$ (2.5+5+2.5)

(a) Determine the STM using the Laplace inverse transform technique.
(b) Determine the solution of state equation
(c) Find the output y(t) at t = 1 sec.

END

SUPPLEMENTARY EXAMINATION

FEB-2019

EE/EL-355: Instrumentation

Time: 3:00 Hours

Max. Marks : 50

> **Note :** Attempt total 10 questions.
> Question no 1 to 5 are compulsory.
> Assume suitable missing data, if any.

Q.1 The digital to analog converter as shown in the figure below is required to give an output voltage in the range of 0 to 5 V, corresponding to 8-bit digital input signal 00000000 to 11111111. Assuming V_{ref} = -15 V and R=10K ohm, calculate the value of R_f and find the output voltage corresponding to an input signal of 11000101? [5]
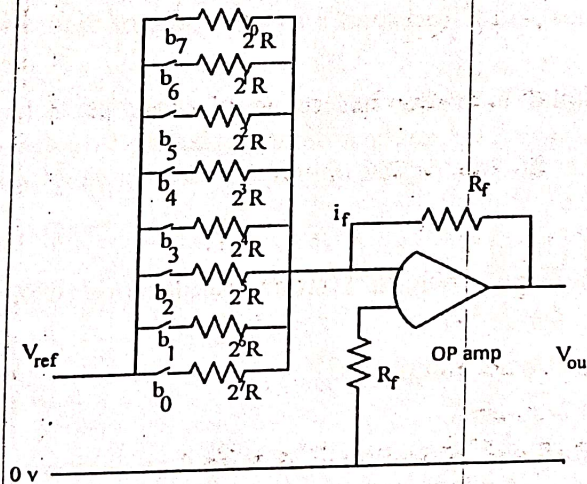
Q.2 A 5 bit converter used for a Dc voltage range of 0-10V. Find the weight of MSB and LSB also exact range of converter and error. Find the error if a 10 bit converter is used? [5]

Q.3 In an R-2R ladder network DAC is required to give an output voltage in the range of 0 to 5 V, corresponding to 5-bit digital input signal 00000 to 11111. Assuming V_{ref}= -20 V and R=2.5 K ohm, calculate the value of R_f and find the output voltage corresponding to an input signal of 10101? [5]

Q.4 In successive approximation ADC, the maximum value of input signal can be 2.55 V and minimum 0 V for 8 bit ADC. Calculate digital output for input signal y_i = 0.515 V with explanation? [5]

Q.5 (a) A Hall effect transducer is used for the measurement of a magnetic field of 0.5 Wb/m^2. The 2 mm thick slab is made of Bismuth for which the Hall's coefficient is -1x10^{-6} Vm/(A-Wb m^{-2}) and the current is 3A. find the Hall voltage generated?

(b) An LVDT with a secondary voltage of 5 V has a range of -25 to +25 mm. find the output voltage when the core is at -18.75 mm from the centre. Also plot the output voltage versus core position for a movement going from +18.75 mm to -10 mm? [5]

Q.6 Explain in detail about working of LED displays with the help of circuit? [5]

Q.7 Explain in detail about Hall Effect sensor with the help of diagram? [5]

Q.8 An analogue to digital converter has an input range of 0 to 5 V and incorporates a 12 bit encoder. Assuming a binary encoder, find the maximum quantisation error and also find the digital output signals corresponding to input voltages of 0.55 V and 2.63 V ? [5]

Q.9 Explain in detail working of Digital Storage Oscilloscope (DSO)? [5]

Q.10 Write short note on counter ramp ADC? [5]

Q.11 Explain in detail different components of Data Acquisition System with the help of block diagrams? [5]

-2-

Q.12 Explain working of Pirani gauge for measurement of pressure? [5]

Q.13 Explain how Load cell and Cantilever beam are used for force measurement? [5]

Q.14 Write short note on Any two : [5]
(a) IEEE 1451 standard
(b) Landline and RF Telemetry
(c) Virtual Instrumentation

-END-

-3-

THIRD SEMESTER
SUPLEMENTARY EXAMINATION

B.Tech(EC)
FEB-2019

EC203   DIGITAL DESIGN-1

TIME: 03 Hrs

Maximum Marks:40

Note: Question no 1 is compulsory. Attempt any four from rest questions. Assume suitable missing data if any.

1. (a) What is De-Multiplexer? State its use.
    (b) Simplify the equation $\bar{A}C\,(\overline{ABD}) + \bar{A}B\bar{C}\bar{D} + A\overline{(B+C)}$
    (c) What is T flip-flop? Give the excitation table for T flipflop.
    (d) Differentiate between Synchronous counter & Asynchronous counter.
    $4\times2 = 8$

2. (a) What is EX-3 Code? Give the logic circuit for BCD to Ex-3 code converter.
    (b) Implement the logic function $f(ABCD) = \Sigma M(0,1,3,6,7,11,12,13,15)$ using 8:1 mux.
    $2\times4 = 8$

3. (a) What is Gray code ? Give the truth table for converting four bit Binary code to Gray code and obtain the logic expression.
    (b) With neat circuit diagram, explain one digit BCD addition.
    $2\times4 = 8$

4. (a) Design a synchronous counter for counting 7 to 0 and repeat. How it can be converted to an up counter?
    (b) Discuss the term PAL & PLA.
    $2\times4 = 8$

5. (a) With neat circuit diagram, explain the working of three bit Flash A/D converter.
    (b) Give the classification of logic family. Give the characteristics and specifications of TTL& CMOS logic families.
    $2\times4 = 8$

6. (a) What is EPROM and EEPROM? State their use and also compare them.
    (b) What is Priority encoder? Design a 2 bit Priority encoder.
    $2\times4 = 8$

END

SUPPLYMENTATY SEM EXAMINATION **FEB-2019**

EC 205   SIGNALS AND SYSTEMS

Time: 3 Hours   **Max. Marks: 40**

> **Question ONE is compulsory ALL Questions**
> **Assume suitable missing data, if any**

1. (a) Determine whether the signal $x(n) = \sin(\frac{6\pi}{7}n + 1)$ is periodic

   State the reasons

   (b) Convolve the signals $u(t-1)$ and $\delta(t-1)$

   (c) Find the DTFT of sequence $x[n] = e^{-n\omega T}u(n)$

   (d) Find the Z-transform and its associated ROC for the signal

   $$x[n] = \{2, -1, 3, 0, 2\}.$$

   (2x4=8)

2. (a) A system is characterized by the differential equation
   $\frac{d^2}{dt^2}y(t) + 6\frac{d}{dx}y(t) + 8y(t) = \frac{d}{dx}x(t) + x(t)$ find the transfer
   function and the output signal $y(t)$ for $x(t) = \delta(t)$.   (6)

   (b) Classify different types of signals with examples   (2)

3. (a) Determine the complex Fourier series of the waveform $x(t)$
   shown in Fig.1.   (4)
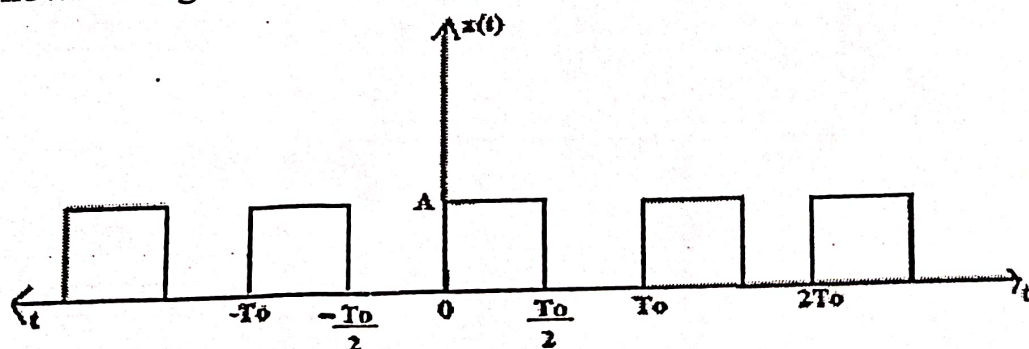
Fig.1.

   (b) Draw the magnitude and phase plot of the Fourier Transform of
   the signal $x(t) = e^{-at}u(t)$ for $a > 0$ (4)

P.T.O

4. (a) The output of system y(t) is defined as $y(t) = \frac{1}{2}\int_{-\infty}^{t} x(z)dz$

determine whether the system is Time invariance, Linearity, Causality and memoryless, where x(t) is input to the system. (4)

(b) State and prove convolution property of Laplace Transform (4)

5. (a) The transfer function of a system is $H(j\omega) = \frac{j\omega}{(j\omega)^2 + 3(j\omega) + 2}$

Find the system equation and the impulse response. (04)

(b) Determine the Nyquist rate for the following signals (04)

(i) $x(t) = 1 + \cos(200\pi t) + 4\sin(400\pi t)$

(ii) $x(t) = 2\cos(600\pi t)\cos(800\pi t)$

6. Write short notes on ANY TWO

(a) Relation between DTFT and Z-Transform

(b) Parsevals engery theorem

(c) Sampling theorem and aliasing

(2x4=8)

(Supplementary Examination)

Total No. of Pages 4   Roll No. ......

THIRD SEMESTER   **B.Tech. [ECE]**

END SEMESTER EXAMINATION   *February-2019*

EC-207 Engineering Analysis and Design
(Network Analysis & Synthesis)

Time: 3.00 Hour   *Max. Marks: 50*

Note: Question number **1** is compulsory. Answer any **four** questions from the rest. Any required data not explicitly given, may be suitably assumed. **Use the answer sheet space judiciously.** Symbols have their usual meanings.

Q1. Choose the correct or best alternative in the following: **10**

(i) In order that f(t) be Laplace transformable, it is sufficient that:

(a) $\int\limits_{0_-}^{\infty}|f(t)|e^{-\sigma t}dt > \infty$ (b) $\int\limits_{0_-}^{\infty}|f(t)|e^{\sigma t}dt < \infty$ (c) $\int\limits_{0_-}^{\infty}|f(t)|e^{-\sigma t}dt < \infty$

(d) some other answer

(ii) The derivative of the unit ramp function is the:
(a) unit step (b) unit impulse (c) doublet (d) some other answer

(iii) Which of the circuits shown in Fig. 1(iii) are characterized by the equation v(t) = Ri(t):
(a) circuit 1 (b) circuit 2 (c) circuit 3 (d) some other answer

circuit 1   circuit 2   circuit 3
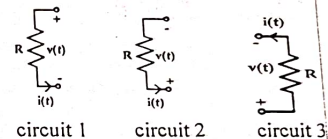
Fig.1(iii)

(iv) The poles and zeros of a positive real function :
(a) Must be in right half of the s plane
(b) Must be in left half of the s plane
(c) Can be anywhere in the s plane
(d) None of the above

(v) The number of twigs, in any selected tree of a graph with 'b' branches and 'n' nodes is:
(a) (n-1) (b) (b-n+1) (c) n (d) (b –n)

(vi) A two-port network is symmetrical if:
(a) $z_{11}z_{22} - z_{12}z_{21} = 1$ (b) $h_{11}h_{22} - h_{12}h_{21} = 1$ (c) $g_{11}z_{22} - g_{12}z_{21} = 1$

Q6. (a) Determine the i(t) and $v_L(t)$ valid for t>0 in the circuit of Fig.6(a)   **5**

Fig. 6(a)

(b) The complete incidence matrix of a planar graph is given below: **5**

Branches→ 1 2 3 4 5 6

Nodes $\updownarrow$
$$\begin{bmatrix} 0 & 1 & 0 & -1 & -1 & 1 \\ 0 & -1 & 1 & 0 & 1 & 0 \\ -1 & 0 & 0 & 1 & 0 & -1 \\ 1 & 0 & -1 & 0 & 0 & 0 \end{bmatrix}$$

Draw the oriented graph. Define branch, node, tree, co-tree, twig and link with examples.

-END-

(a) $AD - BC = 1$

(vii) The input immittance of an LC network must have:
(a) a zero at infinity (b) a pole at infinity (c) either a pole or a zero at infinity (d) neither a pole nor a zero at infinity

(viii) $Re[Z_{RC}(j\omega)]$ is a:
(a) monotonically increasing function of ω (b) monotonically decreasing function of ω (c) positive real constant (d) maximum at a non-zero finite frequency

(ix) The value of current i in the circuit of Fig.1(ix):
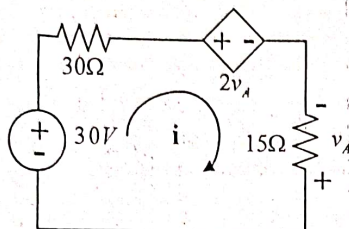
Fig.1(ix)

(a) $1A$ (b) $3A$ (c) $2A$ (d) $0.5A$

(x) Suppose $V_c(t) = \sin(40t + \frac{\pi}{6})V$. The value of $i_c(t)$ in Fig. 1(x) is:

(a) $10\cos(40t + \frac{\pi}{6})A$ (b) $40\cos(20t + \frac{\pi}{6})A$ (c) $10\sin(20t + \frac{\pi}{6})A$

(d) $20\sin(40t + \frac{\pi}{6})A$
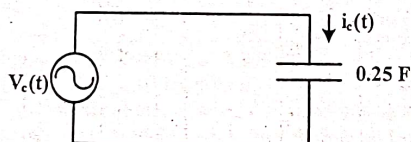
Fig.1(x)

Q2. (a) Derive the inter-relationship between z parameters and h parameters. **5**

(b) Calculate the maximum power that can be delivered to the Load (R_L) for the circuit given in Fig.2(b). **5**
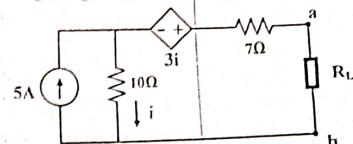
Fig.2(b)

Q3. Find the expression for $v_C(t)$ and $v_L(t)$ in the circuit of Fig.3, valid for all time t. **10**
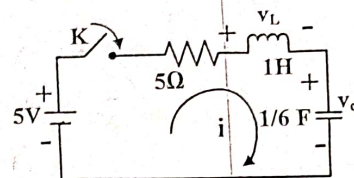
Fig.3

Q4. Which of the following functions is LC driving point impedance? **10**

$$Z_1(s) = \frac{s(s^2+4)(s^2+16)}{(s^2+9)(s^2+25)}$$

$$Z_2(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)}$$

$$Z_3(s) = \frac{s(s+3)}{(s+1)(s+5)}$$

Give justification and synthesize the realizable impedance in second Foster form (parallel) and first Cauer form.

Q5. Which of the following functions is RC driving point impedance? **10**

$$Z_1(s) = \frac{(s+1)(s+3)}{s(s+2)}$$

$$Z_2(s) = \frac{2(s+1)(s+6)}{(s+2)(s+3)}$$

$$Z_3(s) = \frac{(s^2+1)(s^2+16)}{s(s^2+9)}$$

Give justification and synthesize the realizable impedance in one of the form and one of the Cauer form

−128−

THIRD SEMESTER

B.Tech.[Civil Engineering]

SUPPLEMENTARY EXAMINATION

(FEB.-2019)

EC-251 BASIC ELECTRONICS AND INSTRUMENTATION

Time: 3:00 Hrs

Max. Marks: 40

Note: Q1 is compulsory and attempt any five from the rest.
Assume suitable missing data, if any.

Q1.	(a)	State DeMorgan's theorem and its use.	[2]
	(b)	Explain the difference between Synchronous and Asynchronous Counters.	[2]
	(c)	Mention the differences between Primary and Secondary Transducers.	[2]
	(d)	Draw the circuit diagram for the Voltage Follower using the non inverting op-amp.	[2]
	(e)	Draw the V-I characteristics of the PN junction diode.	[2]
Q2.	(a)	Explain the basic types of clamper circuits. Draw the necessary waveforms.	[4]
	(b)	Explain the working of a Full Wave Rectifier.	[2]
Q3.	(a).	Draw and explain the working of an Inductive Transducer.	[3]
	(b)	Draw the common collector circuit and draw the input and output characteristics and also explain the active, cutoff and saturation region by indicating them on the output V-I characteristic curve.	[3]
Q4.	(a)	Draw the circuit for Class B amplifier	[3]
	(b)	Calculate the value of V_{OUT} for non-inverting summing amplifier.	[3]
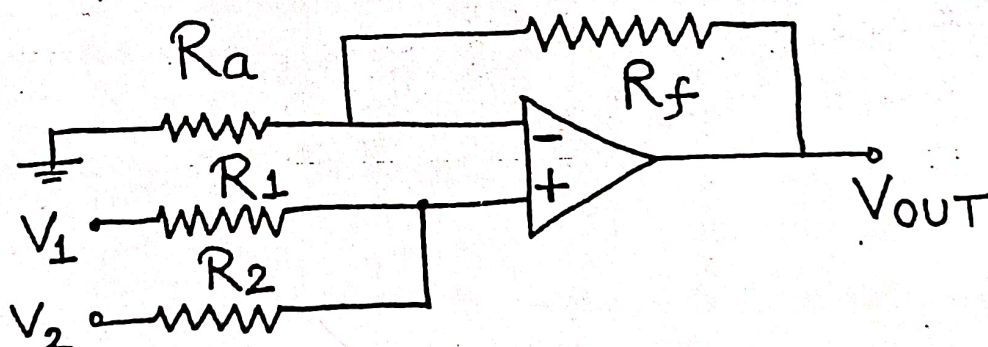
R.T.O

Q5.	(a)	Draw the neat and clear diagram for Cathode Ray Oscilloscope.	[3
	(b)	Draw the Lissajous pattern for the following angle values (i). 45° (ii). 90° (iii). 180°	[3
Q6.	(a)	Explain in detail piezoelectric transducer with its derivation and applications.	[(
Q7.	(a)	Write a short note on Thermistor.	[2
	(b).	Design the Full adder circuit using two half adders along with necessary expressions for Sum and Carry.	[4
Q8.	(a)	Implement the Boolean Expression using minimum number of 3 input NAND Gates. $$f(A, B, C, D) = \sum(1,2,3,4,7,9,10,12)$$	[3
	(b)	Draw the JK flip flop and explain its operation.	[

****Good Luck****

−.130−

BTech. V Sem   EC-301. DIGITAL COMMUNICATION

Maximum Marks-40.

Time-3 hours.

Answer any five questions.

All questions carry equal marks.

1. Sketch the impulse response of the filter matched to the signal s(t) as shown below:
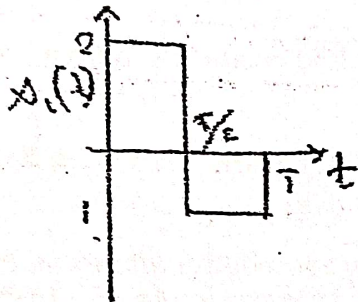
Also derive the expression of impulse response of the filter matched to signal s(t).   (3+5)

2. In ON-OFF keying of a carrier modulated signal, the two possible signals are

$$s_0(t) = 0 \qquad 0 \leq t \leq T_b$$

$$s_1(t) = \sqrt{\frac{2E_b}{T}} \cos 2\pi f_0 t \qquad 0 \leq t \leq T_b$$

P.T.O.

The corresponding received signals are

$$r(t) = n(t) \qquad 0 \leq t \leq T_b$$

$$r(t) = \sqrt{\frac{2E_b}{T_b}} \cos 2\pi f_c t \qquad 0 \leq t \leq T_b$$

Where n(t) is additive White Gaussian Noise with PSD N/2 watts/Hz. Derive the probability of error for the detector. (8)

3. Construct a duo-binary coder for a binary sequence {bn} and derive the time domain and frequency domain characteristics of the duo-binary signal. (8)

4. Explain binary frequency shift keying (FSK) with its constellation diagram. Find the. (8) expression of probability of error for FSK received signal in presence of AWGN noise with PSD N/2 watts/Hz.

5. a) Explain with block diagram the principle of Frequency-hopped spread spectrum. (4+4)
   b) Explain how PN- sequences are generated.

6. a) Explain binary PCM system with block diagram. (2+3+3)
   b) Why we need quantisation? Explain A-law of quantisation.
   c) A signal m(t) with dynamic range equal to 2V is uniformly quantised by a M- level quantiser. Each quantised levels are encoded by n number of binary bits. Find the maximum signal to quantisation noise ratio in dB assuming that quantisation noise has uniform probability distribution within each quantum step.

7. Explain the following: (4+4)
   a) Chebyshev's Inequality.
   b) Central limit theorem.

EC-303 LINEAR INTEGRATED CIRCUITS

Time: 3 Hours   Max. Marks: 40

Note: Answer *Any five* questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q1.   (a) Determine $\dfrac{V_0(s)}{V_{in}(s)}$ for the circuit show in Fig.1.

Fig.1
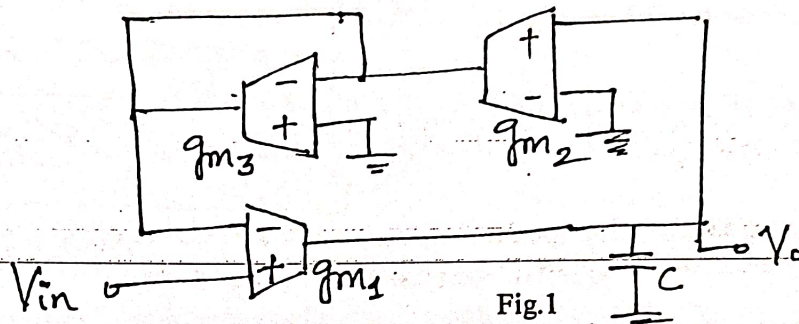
(b) Design a 2nd order band pass filter using OTA and hence find its cut-off frequency.

Q2.   (a) Design an monostable multivibrator using OP-AMP to generate a pulse of pulsewidth 1ms. Use a capacitor of 100pF. Explain the circuit with waveforms.

(b) Explain with a circuit diagram, how IC 555 timer can be used as Voltage Controlled Oscillator (VCO). Also determine the frequency of oscillations.

Q3.   (a) Describe with neat circuit diagram how analog multiplier can be used for:
(i) Amplitude modulation and demodulation
(ii) Measurement of phase angle.

(b) Design and discuss a precision full wave rectifier using OP-AMP.

Q4.   (a) Describe and discuss the three modes of operation of an IC PLL.

P.T.O

(b) Draw a neat circuit diagram of a four quadrant Gilbert multiplier cell and determine the conditions for which the cell can be used for analog signal processing.

Q5. (a) Assuming, $A_{v1}(s) = A_{v2}(s) \cong \dfrac{\omega_t}{s}; \omega_t = A_0\omega_p$, determine the output voltage of a passive compensated inverting amplifier using OP-AMP.

(b) (i) For the circuit shown in Fig.2, assume all the transistors to be identical with finite current gain ß. Find the I_{o1} and I_{o2} in terms of I_{ref}.

(ii) What is the actual value of the current I_{o1} and I_{o2} if $I_{ref}=0.7mA$ and $ß=30$.

Fig.2
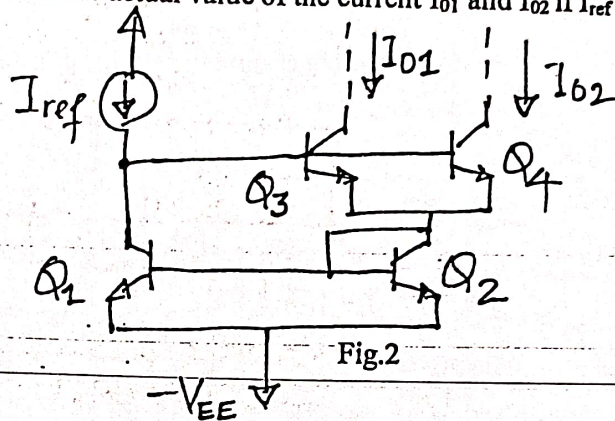
Q6. (a) Design a simulated inductor of 10 mH using General Impedance Converter (GIC).

(b) For the emitter- coupled differential amplifier as shown in Fig.3, draw its small signal equivalent and hence determine:
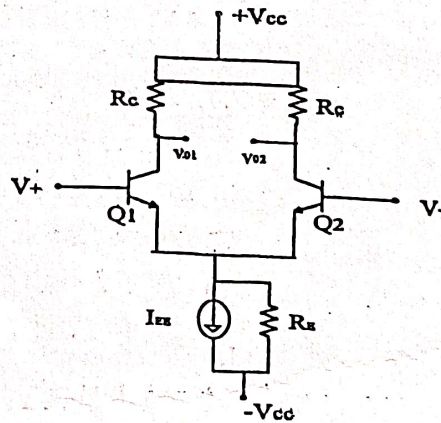
Fig.3

(i) Common mode voltage gain (A_{cm}), differential mode voltage gain (A_{dm}) and
(ii) Common mode rejection ratio (CMRR).

-END-

Total No. of pages:2   Roll No............

V TH SEMESTER   **B.Tech (ECE)**

SUPPLIMENTARY EXAMINATION   **Feb 2019**

<u>EC-313</u> **MICROPROCESSORS AND INTERFACING**

Time :3 Hrs   Maximum Marks: 70

Note: Question No 1 is compulsory Answer any four questions from remaining. Assume missing data if any.

1. (i) Explain the significance of memory segmentation in the context of 8086 architecture   (4)

   (ii) Explain the following instructions / directive with the help of an example

   (a) REPZ/REPNZ (b) AAA (c) LDS BX 1010H (d) CBW (4)

   (iii) In FNM non specific EOI is issued to master as well as slave. Why?   (2)

   (iv) Discuss the major processing units of 80286. Also Comment on virtual memory it can address   (4)

2. (a). Differentiate between machine cycle and instruction cycle. Explain both with the help of an example instruction MVI A 24H
                                                                   (4)

   (b) In 8085, how do you de-multiplex, the multiplexed data and address bus ? Explain with the help of a neat sketch.   (3)

   (c) Draw and explain the maximum mode configuration of 8086 with the help of a neat sketch.   (7)

3 (a) Interface 4 KB RAM and 8 KB ROM to 8086 using 2KB memory chips for both RAM and ROM. Explain with the help of neat block diagram   (7)

   (b) Identify the addressing mode and calculate the physical address for the following instructions   (4)

   (i) Call DWORD PTR (BX)   (ii) JMP CX

   Assume BX = 2000 H, Contents of memory location 2000H is 0008H and 2001H is 1000H, CX = 50H, DS = 1000H

                                                                   P.T.O

(c) Explain the function of following directives with suitable example (3)

(i) EXTERN   (ii) ALLIGN   (iii) LENGTH

4 (a) Write an assembly language program to find out the number of even and odd numbers from a given series of data words (7)

(b) Write a program to add two multi-byte numbers and store the result as a third number. The numbers are stored in the form of bytes with least significant byte at the first location (7)

5 (a) Write a FAR procedure to compute the value of "A" in the following equation (7)

$$A = \sum_{i=1}^{n} X_i Y_i$$

(b) Check whether the given string is palindrome or not and if it is display 01 at port 00FFH else display 00 at the same port. (7)

6 (a) Describe the procedure for segment privilege level protection in 80386. How does user program access segments at higher privilege level programs? (7)

(b) Explain how does 80386 computes physical address when it's paging mode is enabled. (4)

(c) What are the advantages of page based virtual memory over segments based virtual memory? (3)

7 (a) With the help of a neat block diagram explain the working of 8255 mode-1 or 8254 programmable Timer (7)

(b) Explain how 8259 communicate ISR address to 8085 (4)

(c) Explain all instruction command words of 8259 (3)

8 . Write Short Notes on any 4 topics given below (14)

(i)   Interrupt 8086
(ii)   Pipeline architecture of 8086
(iii) Memory organization of 8086
(iv)   Clock generator 8284
(v)   Pin diagram of 8086
(vi)   Virtual memory

-END-

Total No. of Pages: 01
B.Tech. (ECE)
Supplementary Examination

Roll No....:..........
Fifth Semester
Feb-2019

EC-315: COMPUTER COMMUNICATION NETWORKS

Time: 03 hours

Max. Marks: 50

Note: All Questions are compulsory.
Assume suitable missing data, if any.

1. [a] What is the difference between service, protocol and protocol stack?
   [6]

   [b] State 4 main responsibilities of the data link layer with respect to OSI model.
   [4]

2. [a] Differentiate between CSMA, CSMA-CD and CSMA-CA protocol.
   [6]

   [b] Differentiate between ALOHA and slotted ALOHA.
   [4]

3. [a] Differentiate between UDP and TCP protocol.
   [6]
   [b] Explain ARP and RARP protocol.
   [4]

4. [a] Explain the structure of firewall.
   [4]
   [b] Explain DNS and electronic mail.
   [6]

5. [a] Differentiate between cellular networks and adhoc wireless networks.
   [6]

   [b] Explain 4 applications of adhoc wireless networks.
   [4]

-END-

SUPPLEMENTARY EXAMINATION   Feb.-2019

DIGITAL IMAGE PROCESSING (EC357)

Time: 3:00 Hours   Max. Marks: 50

Note: Answer all questions. All questions carry equal marks. Assume suitable missing data.

Q.1 Answer all the questions.

[a] Define three types of adjacencies.   [1.5]

[b] Write down the expression for power law transformation and show the plot for different values of gamma.   [2]

[c] Differentiate enhancement and restoration.   [1.5]

[d] Define dilation and erosion.   [1.5]

[e] Discuss different image file formats.   [2]

[f] How do we achieve centre shifting in 2-D DFT?   [1.5]

Q.2 Attempt any TWO of the following

[a] State and explain the examples of fields, based on radiation from EM spectrum, that use Digital Image Processing.   [5]

[b] Consider the intensity values of an $(M \times N)$ digital image as the random quantities. Write down the expressions for mean (average), variance, and nth moment of intensities. Also explain the significance of mean and variance of the image in respect of its visual properties.   [5]

[c] Develop a procedure to calculate the Discrete Cosine Transform of an (8×8) image. Assume suitable intensity values.   [5]

P.T.O.

Q.3 Attempt any TWO of the following

[a] Classify 2D systems. Also, with the help of suitable example, explain the concept of 2D Convolution. [5]

[b] Consider (64 × 64) hypothetical image whose histogram values are as shown below (column three of the table). It is desired to transform this histogram so that it will have values specified in the second column of the table. Develop a procedure to obtain the specified histogram. [5]

x_q	Specified $P_z(x_q)$	Actual $P_r(z_k)$
$x_0 = 0$	0.00	0.00
$x_1 = 1$	0.00	0.00
$x_2 = 2$	0.00	0.00
$x_3 = 3$	0.15	0.19
$x_4 = 4$	0.20	0.25
$x_5 = 5$	0.30	0.21
$x_6 = 6$	0.20	0.24
$x_7 = 7$	0.15	0.11

[c] Prove that $\nabla^2 f(t,z) \Leftrightarrow -4\pi^2(\mu^2 + v^2)F(\mu,v)$ where ∇^2 is the Laplacian of a continuous function $f(t,z)$ and $F(\mu,v)$ represents Fourier Transform. [5]

Q.4 Attempt any TWO of the following

[a] What are the most common PDFs found in image processing applications. Write down the expressions for these and show the plots of the density functions. [5]

[b] Why are the adaptive filters called so? Develop the adaptive median-filtering algorithm and explain its working. [5]

[c] Discuss the following with respect to morphological image processing: [5]
(i) Region Filling
(ii) Pruning

P.T.O.

Q.5 Attempt any TWO of the following

[a] Write short notes on the following Color Models [5]
(i) HSI Model
(ii) YCbCr Model

[b] Consider the simple 4 × 8, 8-bit image: [5]

```
21  21  21  95 | 169  243  243  243
21  21  21  95 | 169  243  243  243
21  21  21  95 | 169  243  243  243
21  21  21  95 | 169  243  243  243
```

(i) Compute the entropy of the image
(ii) Compress the image using Huffman coding
(iii) Compute the compression achieved and the effectiveness of the Huffman coding with respect to maximum compression possible.

[c] Explain how is Laplacian of a Gaussian (LoG) operator helpful in detecting the edges of an image. Also show the (5 × 5) mask that approximates the shape of LoG. [5]

END

Total No. of Pages 2

SIXTH SEMESTER — VII

Roll No. ......

B. Tech (E&C)

SUPPLEMENATRY EXAMINATION

Feb.2019

EC405 MICROWAVE ENGINEERING

TIME: 3Hrs

Maximum Marks: 40

Note:

1) Question No. 1 is compulsory. Attempt any FOUR out of remaining questions.
2) Assume suitable missing data.

Q. 1. Write short notes on the followings :-   (2 x 5 = 10 Marks)

(a) What are the required conditions for maximum efficiency of two cavity klystron?

(b) How are microwave measurements different from low frequency measurement?

(c) Define s-parameters and derive the zero, unity property of s-matrix.

(d) Why waveguide twists and bends are constructed in this way that the direction of propagated energy changes gradually?

(e) Explain the working of isolator using ferrite. Mention their typical application.

Q2.(a) Compare Transferred Electron Devices with Avalanche Transit Time Devices.   (3 Marks)

(b) The input power to a 20 dB attenuator is 100mW. Find output power and the power absorbed by the attenuator. (3Marks)

(c) What is velocity modulation? How is current modulation obtained in two cavity klystron?   (4 Marks)

P.TO

Q3. (a) Describe the negative resistance effect of GUN diode using two-valley model. (3 Marks)

(b) Compare operation of reflex klystron with two cavity klystron. Derive formula for minimum required repellar voltage of reflex klystron. (4 Marks)

(c) An X band directional coupler has a coupling coefficient of 10dB. What will be the output power in the main branch if the input power is 20mW? (3 Marks)

Q4. (a) Explain Tunnelling effect. Compare principle of PIN diode with Tunnel diode (4Marks)

(b) Why Hybrid tee is known as Magic tee and write its properties. (3 Marks)

(c) What are the advantages of parametric amplifier? Explain concept of parametric Up and Down Converters. (3 Marks)

Q5. (a) Explain working principle of cylindrical magnetron. Derive formulas for cut-off voltage and magnetic flux intensity. (7 Marks)

(b) For an IMPATT diode v_d (carrier drift velocity) = 2.5 x 10^7 cm/s, L (drift region length) = 5 μm and η (efficiency) = 25 %. Calculate resonant frequency. (3Marks)

-------------------------END-------------------------

END SEMESTER EXAMINATION

B. Tech: ECE
(FEB-2019)

Subject: OPTICAL COMMUNICATION

Supplementary Exam

Time: 3:00 Hours

Paper Code: EC-407

Max. Marks: 40

> **Note:** Answer any *TEN* questions. All questions carry equal marks.
>
> Assume suitable missing data, if any.

1. A typical relative refractive index difference for an optical fiber designed for long distance transmission is 1%. Estimate the NA and the solid acceptance angle in air for the fiber when the core index is 1.46. Further, calculate the critical angle at the core–cladding interface within the fiber. It may be assumed that the concepts of geometric optics hold for the fiber.

2. An optical fiber in air has an NA of 0.4. Compare the acceptance angle for meridional rays with that for skew rays which change direction by 100° at each reflection.

3. A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 60 µm. The fiber has a numerical aperture of 0.2. Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1.25 µm.

4. Estimate the maximum core diameter for an optical fiber with the relative refractive index difference (1.5%) and core refractive index (1.48) in order that it may be suitable for single-mode operation. It may be assumed that the fiber is operating at the same wavelength (0.85 µm). Further, estimate the new maximum core diameter for single-mode operation when the relative refractive index difference is reduced by a factor of 10.

5. Explain the concept of electromagnetic modes in relation to a planar optical waveguide. Discuss the modifications that may be made to electromagnetic mode theory in a planar waveguide in order to describe optical propagation in a cylindrical fiber.

6. Discuss absorption losses in optical fibers, comparing and contrasting the intrinsic and extrinsic absorption mechanisms.

7. Briefly describe linear scattering losses in optical fibers with regard to:
   (a) Rayleigh scattering;
   (b) Mie scattering.
   The photo elastic coefficient and the refractive index for silica are 0.286 and 1.46 respectively. Silica has an isothermal compressibility of 7×10^{-11} m² N⁻¹ and an estimated fictive temperature of 1400 K. Determine the theoretical attenuation in decibels per kilometre due to the fundamental Rayleigh scattering in silica at optical wavelengths of 0.85 and 1.55 µm. Boltzmann's constant is 1.381×10^{-23} K⁻¹.

8. Explain the amplification mechanism in Erbium Doped Fiber Amplifier [EDFA] and discuss EDFA architecture.

9. Describe the two distinctive features of an optical soliton pulse and indicate how loss-managed soliton are produced and maintained on an actual single-mode fiber link.

10. Briefly describe the major reasons for the cabling of optical fibers which are to be placed in a field environment. State the functions of the optical fiber cable.

11. An optical fiber has a core refractive index of 1.5. Two lengths of the fiber with smooth and perpendicular (to the core axes) end faces are butted together. Assuming the fiber axes are perfectly aligned, calculate the optical loss in decibels at the joint (due to Fresnel reflection) when there is a small air gap between the fiber end faces.

12. A step index fiber has a core refractive index of 1.5 and a core diameter of 50 µm. The fiber is jointed with a lateral misalignment between the core axes of 5 µm. Estimate the insertion loss at the joint due to the lateral misalignment assuming a uniform distribution of power between all guided modes when:
    (a) there is a small air gap at the joint;
    (b) the joint is considered index matched.

Total No. of Pages: 2

SEVENTH SEMESTER

Roll No.:..........................

B.TECH (ECE)

END-SEMESTER EXAMINATION (SUPPLEMENTARY) FEBRUARY-2019

Time: 3:00 Hours

EC-409 Computer Vision

Max. Marks: 50

> **Note:** *Q1 is compulsory.
> **Answer any 08 questions out of remaining 10 questions i.e. Q2 to Q11.
> ***Assume suitable missing data, if any.

1. Answer all the following Compulsory questions:

   [a] Explain the projection matrix. [3]
   [b] Define the epipole, epipolar plane and epipoloar line. [3]
   [c] Explain the camera matrices. [2]
   [d] Determine the skew-symmetric matrix from any two 3x1 vectors. [2]

2. The first and second cameras are specified by camera projection matrices, P and P'. The ray formed by two points, x (scene co-ordinate) and X (image co-ordinate) corresponding to first camera, $Px = X$ is projected onto second image plane at second camera centre, $P'C'$ and epipole, $P'C$, forming the epipolar line, $l' = FX$, by joining these two points, where F is a Fundamental matrix. Considering the above, derive the expression of F. [5]

3. Perform the histogram equalization for the following distribution of gray levels in the image: [5]

Gray levels	0	1	2	3	4	5	6	7
No of pixels	790	1023	850	656	329	245	122	81

4. Explain the Harris corner detector and derive the conditions for which edges and corners are located in the image. [5]

5. Scale Invariant Feature Transform (SIFT) is an algorithm used to detect and describe the local features in the images. Explain the main stages of computation of local features. [5]

6. Explain the optical-flow detection method for the solution of over-determined system of equations of local image flow vectors. [5]

7. An equation of the line in 3D space is given by $\dfrac{x - x_1}{l} = \dfrac{y - y_1}{m} = \dfrac{z - z_1}{n} = \lambda$: Project this 3D line into two image planes whose centers of projections are situated at $(0,0,0)$ and (x_d, y_d, z_d). Let the focal lengths of both the cameras are 'f_1' and 'f_2'. Obtain the equations of lines L_1 and L_2 in both the image planes. [5]

8. Consider the problem of image blurring in camera caused by the accelerated motion along x and y direction. The image in camera is at rest at $t = 0$ and undergoes the accelerated motion, $x_0(t) = \dfrac{at}{T}$ and $y_0(t) = \dfrac{bt}{T}$ along x- and y-direction for a time T where a and b are constants. Consider the exposure time of camera as T. Find out the blurring function. Shutter opening and closing time of camera are negligible. [5]

9. Explain the operation of particle filter relating the prediction and measurements of states. [5]

PTO

10. Explain the wavelet series expansions along with the determination of scaling and detail co-efficients. [5]

11. Find the equivalent filter, $H(u, v)$ that implements the spatial operation performed by the Laplacian mask in the frequency domain. [5]

------------------END------------------

Total No. of Pages 02

THIRD SEMESTER

SUPPLEMANTRY EXAMINATION

EN 207   **ENGINEERING ANALYSIS AND DESIGN**

Time: 3 Hours

Roll No. ....

B.Tech. ENE

(February-2019)

Max. Marks: 40

Note: Answer any five questions, All questions carry equal marks

Use of IS 456:2000 and IS 800:2007 are allowed

Assume suitable missing data, if any

1. (a) Find the safe load to be carried by a RCC beam simply supported over a span of 5 m. The beam is of size 300mm x 500mm and reinforced with 4 bars of 20mm diameter at tension zone and 2 bars of 20mm diameter in compression zone, use M30 concrete and Fe 415 steel, the construction site is situated in DTU, Delhi.

   (b) Enumerate the assumptions of limit state design method.

2. A square column of unsupported height 3 m is effectively held in position and restrained against rotation at both ends. Design the column to carry a factored load of 1500kN; use M30 grade of concrete and Fe 415 steel.

3. Design and draw the reinforcement detailing of **intermediate panel of the slab continuous over all of its edges**. The slabs are supported by column of size 300mm x 300mm at all junctions. The size of panel is 3m x 3m. The building is residential use M30 concrete and Fe 415 steel.

4. A solid footing has to transfer a dead load of 1500kN including imposed load from a square column 300 x 300mm (with 20 mm bars). Use M25 concrete, Fe 415 steel and safe bearing capacity to be 200kN/m^2, design the footing.

5. What are the advantages and disadvantages of bolted connections? Explain different modes of failure of bolted connections.

6. Write short notes on following:

   (a)   Durability of concrete

P.T.O.

(b)   Slump of concrete

(c)   Types of welded connection in steel structure

(d)   Limit state of Serviceability

Total No. of pages : 2

Roll No:_____

B. Tech. [ENE]

FIFTH SEMESTER
SUPPLEMENTARY EXAMINATION

FEB – 2019

EN 307 PLANNING AND DESIGN OF ENVIRONMENTAL
ENGINEERING WORKS

Duration: 3 Hours

Maximum Marks: 4(

Note:	Answer ALL questions. All questions carry equal marks.
	Assume suitable missing data, if any.

Q.1. Answer ALL the following questions:
   a. Discuss the role of planning in achieving sustainable development.
   b. Discuss the concept of Environmental Management.
   c. Role of population forecast in design of environmental engineering works.
   d. Write a note on modeling for planning.
   e. Discuss preventive maintenance works.

Q.2. Attempt any TWO questions out of the following:
   a. Discuss the effect of land degradation on soil fertility.
   b. Discuss the effect of overcrowding on environmental engineering works.
   c. Discuss the factors affecting per capita demand of water.

Q.3. Attempt any TWO questions out of the following:
   a. Discuss the effects of use of land-resource as a waste disposal site.
   b. How are public utilities managed?
   c. Discuss the principle and theory of cyclone separator for control of air pollutants.

Q.4. Attempt any TWO questions out of the following:
   a. Water is required to be transported from an overhead tank to an urban area 800 m apart. Determine the diameter of pipe required for transporting wat at a discharge rate of 12 litres/sec ensuring a velocity of 0.75 m/s using nomogram (printed overleaf). Also determine the head loss.
   b. Predict the population for the year 2031, and 2041 from the following population data using arithmetic increase method and geometric increase method.

Year	1961	1971	1981	1991	2001	2011
Population	8,50,000	10,10,000	12,00,000	17,00,000	20,00,000	26,00,000

   d. Water is to be lifted from a tube well to an overhead tank. Find the BHP o the pumping unit for the following data:
      • Discharge from tube well 60 litre/sec

P. T.O

- R.L. of ground 201.50 m
- R.L. of water in tube well 180.00 m
- Depression head during pumping 4 m
- R.L. of bottom of overhead tank 220.50 m
- Depth of water in tank 3.5 m
- Length of rising main or pipe 100 m
- Co-efficient of friction 0.01
- Velocity of water in rising main 2 m /sec

Q.5. Attempt any TWO questions out of the following:
a. With the help of a neat sketch, explain the principle, construction and working of a bag filter.
b. Discuss the factors affecting population growth.
c. Write a note on Zoning method of urban planning.
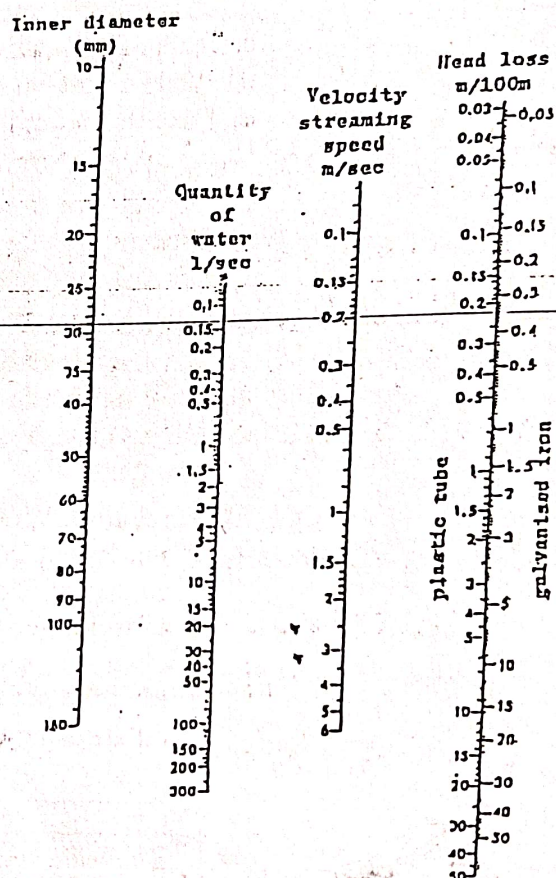
Fig 1. Monograph for PE and GI Pipes

___1st.___ SEMESTER   B.Tech./M.Tech./MBA/Ph.D/ B.Tech. (Eve[ ]

SUPPLEMENTARY EXAMINATION   Feb-2019

FEC-10   COMMUNICATION SKILLS

Time: 3:00 Hours   Max. Marks: 50

Note: Answer all question. All questions carry equal marks.
Assume suitable missing data, if any.

Q.1[a] Comment on the title "The Dream I didn't Have" with reference
to the poem by Vijay Seshadri.   (5)

[b] Give your reading of who could be the three persons in
Seshadri's "Three Persons."   (5)

Q.2[a] Use the following idioms as part of a sentence   (5)
better late than never; under the weather;
beat around the bush; a bone of contention; a dime a dozen

[b] Describe, with examples, non-verbal communication.   (5)

Q.3 Give phonetic transcription of the following words: (10)
Conclusive, ignorance, reasonable, register, authority,
Image, identify, income, bother, mouse

Q.4 Give technical description of *any two* of the following: (10)
Electric oven; solar water heater; natural geyser

Q.5 To what extent is the monster in *Frankenstein* a victim of a society
that has abandoned and rejected him?   (10)

IST SEMESTER   B.Tech.[All]

SUPPLEMENTARY EXAMINATION   Feb-2019

FEC 12   Business Communication & Presentation Skills

Time: 2:00 Hours   Max. Marks : 50

Note : Answer all questions...

Q.1   Write short notes on **ANY TWO** of the followings :   10
   a) Verbal and Non –Verbal communication
   b) Oral Presentation
   c) Features of good Presentation
   d) Types of Interviews
   e) Tips for facing Interview

Q.2   You are Vineet/ Vineeta residing at 23,Lakshmi Apartments,Rampuram,MG Marg, Indraprastha Extension,New Delhi-52. You have come across an advertisement in "The Times of India" for the recruitment of Electrical Engineer in Mehta Engineering Works ,Gokhale Marg ,Poona-3.Apply in response to this advertisement, giving your detailed Biodata (CV). Invent all necessary details.

10

Q.3 Suppose there is a post of Production manager in a company and a group
   discussion for the same is being organized. The topics for GD given are :   10
   1. Examinations should be abolished from the University system.
   2. Technology creates more problems than it solves.
   Choose a topic and express and elaborate GD on the chosen topic.

P.T.O

Q.4 A Mock Press is organized for the Prime Minister Narendra Modi. Ask Five
relevant questions and its Five answers given by the personality.   10

OR

Assume that you are a part of a Mock Parliament. The topic of the bill is " SPORTS-
A COMPULSORY SUBJECT IN CLASS Xth &XIIth BOARD
EXAMINATIONS ". Give arguments that can be potentially forwarded both in favour
and against the bill .

Q.5 Write an Extempore on **Any ONE** of the topics: 5
   1. The entry of women into armed forces.
   2. How cyber crime can be prevented on internet.

Q.6 Choose the correct **synonym** for the following words :   5
   1.Fallacy
   a) destroy b)damage c) blunder d)snatch
   2. Distinction
   a) degree b) difference c) diffusion d) disagreement
   3. Facility
   a) desirability b)means c) happiness d) willingness
   4.Elastic
   a) free b) liberal c) flexible d)broad
   5. Aggression
   a)friendly b)deterioration c) hostility d) loathe

−150−

Total No. of Pages 02

Roll No. ......

First Semester

B.Tech (Elective)

SUPPLEMENTARY EXAMINATION

Feb. -2019

FEC- 18   Financial Statement Analysis

Time: 2:00 Hours

Max. Marks: 50

Note: Answer any five questions. All carry equal marks. Assume suitable missing data, if any.

1) What is meant by the term "Generally Accepted Accounting Principles"? Explain the meaning and significance of any two of the following: a) The Going Concern principle b) Matching principle c) Dual aspect concept.

2) Explain the significance of calculating profitability ratio. Explain the different type of profitability ratio an investor will look into? Calculate Net profit Margin from the given data.

	Rs.
Sales	4,00,000
Operating Expenses	160,000
Marketable securities	80,000
Cash	120,000
Tax	40,000
Interest	20,000

3) Define the term "Assets". Explain different types of assets with suitable examples. How is it different from Liabilities of an organization.

P·T·O−

4) What is the significance of preparing Cash Flow statement by companies? State two limitations of the same.

5) "Ratio analysis is a tool to examine the health of the business with a view to make the financial results more intelligible." Clarify this statement with suitable examples.

6) Why is financial forecasting necessary? Explain any two techniques through which financial forecasting can be done?

XXXXX

SUPPLEMENTARY EXAMINATION Feb-2019

FEC 19 BASICS OF ACCOUNTING

Time: 2:00 Hours   Max. Marks: **50**

Note : Answer all question. Assume suitable missing data, if any

Read following transactions for the month of January 2019, carefully:

S.No	Date	Transaction
1.	Jan.1	Mr. Bharat Commenced business with a Capital ₹ 30,000 in Cash.
2.	Jan.1	Introduces Office Equipment worth ₹ 45,000 in business, as part of Capital introduced.
3.	Jan.1	Amount deposited in State Bank of India 95,500 by cheque as additional Capital.
4.	Jan.2	Stationery purchased 5,800 in cash;
5.	Jan.2	Taken Loan from friend Hari Om ₹ 50,000 by Cheque @ 1% per month
6.	Jan.5	Furniture purchased from M/s Krishna Enterprises ₹ 45,000 on credit
7.	Jan. 5	Goods purchased on Credit from Sri Ram Enterprises for ₹87,000
8.	Jan.11	Goods costing ₹ 7,500 sold to Dinesh Kumar for Cash with 20% profit (create separate account for Profit/Loss on Sale of Goods)
9.	Jan.13	Goods costing ₹60,000 sold to Mahesh Kumar & Co on Credit with 25% profit
10.	Jan.13	Allowed Discount of 2% to Mahesh Kumar & Co on sale value
11.	Jan.23	Advance received against supply of goods from Mohan ₹15,000 by cheque
12.	Jan.25	Cash drew from Bank ₹25,000 for Personal use
13.	Jan.31	Wages paid in Cash ₹9,500
14.	Jan.31	Paid Advance Rent ₹7,000 by cheque for the month of February
15.	Jan.31	Electricity Bill for the month of January ₹ 6,500, with due date 15th of next month
16.	Jan.31	Interest payable to Hari Om in terms of loan agreement. Interest payable in 7 days from the end of the month.
17.	Jan.31	Depreciation @ 12% per annum on all Assets

In respect of above transactions, you are required to give:

Q.1	Journal Entries	(17 marks)
Q.2	Ledger Accounts from Journal	(20 marks)
Q.3	Trial Balance as at 31st January 2019	(5 marks)
Q.4	Profit & Loss account for the month of January 2019	(3 marks)
Q.5	Balance Sheet as at 31st January 2019	(5 marks)

—153—

FIRST SEMESTER

B.Tech/B.Design

SUPPLEMENTARY EXAMINATION

FEB-2019

FEC 37   FRENCH

Time: 3:00 Hours

Max. Marks : 50

Note : Answer all question by Selecting any two parts from each
questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1[a]   je .... le film
[b]   regarde
[c]   mange

Q.2[a]   j'............un chien
[b]   ai
[c]   suis

Q.3[a]   il ....a papa
[b]   y
[c]   a

Q.4[a]   c'........facile
[b]   est
[c]   ai

Q.5[a]   ....tout le monde
[b]   salut
[c]   bonjour

IST SEMESTER

SUPPLEMENTARY EXAMINATION

FEC 39

B.Tech.[All]

FEB -2019

Japanese

Time: 2:00 Hours

Max. Marks 5 0

Note: Answer all questions.

Choose appropriate from A to D

(1 x 1 5=15)

(1) 1. わたし（　　）がくせい です。

A) は　　　　B) で　　　　C) の　　　　D) に

2. サントスさん は がくせい です、 わたし（　　）がくせいです。

A) で　　　　B) に　　　　C) も　　　　D) を

3。わたし は まいばん ほん（　　）よみます。

A) が　　　　B) を　　　　C) に　　　　D) は

4。らいげつ アメリカ（　　）いきます。

A) で　　　　B) も　　　　C) に　　　　D) へ

5. あなたは まいばん なんじ（　　）おきますか。

A) で　　　　B) に　　　　C) を　　　　D) が

6. Apple は なん（　　）かいしゃ です か。

A) で　　B) の　　C) を　　　　D) へ

[P.T.O.]　　1

7. INDIA GATE は （　　）ですか。

A）いくつ　　　　B）どこ　　　　　　C）なんさい　　　　　　D）どれ

8. この　かばん　は　だれ（　　）ですか。

A）の　　　　　B）に　　　　　　C）は　　　　　　　　D）も

9。わたしは　まいあさ　なに（　　）たべません。

A）も　　　　　B）に　　　　　C）で　　　　　　　　D）を

10。その　コンピューター　は（　　）ですか。

A）いくつ　　　　B）なに　　　　　C）いくら　　　　　D）どこ

11. いま（　　）ですか。
　　　3じはんです。

A）どこ　　　　　B）なんじ　　　　C）じはん　　　　D）じかん

12. この　とけい　は（　　）の　です　か。

A）だれ　　　　　B）どこ　　　　C）どれ　　　　　D）いつ

13. にほんじんは　なん（　　）ごはんを　たべます　か。

A）が　　　　　B）の　　　　　C）に　　　　　　D）で

14. コーヒー（　　）のみます。

A）を　　　　B）で　　C）に　　　　　　D）の

15。この　ラジオ（　　）わたしのです。

A）は　　　　B）の　　C）に　　　　　　　D）も

2.)   – 156 –

(A)   Write Japanese equivalent for the following words
(Hiragana) :–

Desk, November, hundred, University, school

(5)

B) Write English equivalent for following words :–

いす、わたし、　かいしゃ、しんぶん、せんせい

(5)

(3.)

Write the answer for following questions   :–

1）あなた　の　なまえは　なん　ですか。

2）きょうは　なんがつ　なんにち　ですか。

3）あなた　は　なんさい　ですか。

4）あなたの　ほん　は　どこ　です　か。

5）まいあさ　なに　を　たべますか。

6）うちは どこ です か。

7）あなたは がくせい ですか。

8）まいにち にほんご を べんきょうします か。

9）まいにち なん で がっこう へ きます か。

10）あした どこ へ いきます か。

(10)

4)

A) Write Into **Katakana** :－

れい :－   Class＝ クラス

Engineer, Notebook, toilet, Coffee, Television,

(5)

B) Fill the appropriate Word:-

1) ぎんこう は （   ）ですか。
   あそこです。

2) かいしゃ は （   ）ですか。
   Sony です。

3) これ は （   ）の ワイン ですか。
   インド の ワイン です。

4) honda は（　　　）の　かいしゃですか。
じどうしゃ　の　かいしゃ　です。

5) きのう（　　）まで　べんきょうしたか。
１１じまで　べんきょうした。

(5×1=5)

5) (A)　Write the Kanji for following words
3, 6, 8, 7, 10

(2.5)

(B) Write the answer for following questions in Japanese (**Hiragana**)

1. Capital of Japan
2. Currency of Japan

(2.5)

FIRST SEMESTER

SUPPLEMENTARY
END SEMESTER EXAMINATION

B.Tech./M.Tech./MBA/Ph.D/ B.Tech. (Evel)

Feb-2019

PAPER CODE **FEC40** & TITLE OF PAPER **GERMAN**

Time: 3:00 Hours

Max. Marks: 50

> **Note:** Answer all questions.
> All questions carry equal marks.
> Assume suitable missing data, if any.

Q.1   schreiben sie die zahlen.   (10)
          (Write down the numbers.)

A) 5	D) 12	G) 0	J) 10
B) 16	E) 8	H) 6	
C) 20	F) 9	I) 3	

Q.2 Ergänzen Sie Die Verben.   (10)
       (Fill up the verbs.)

[a] Ich _____ aus Indien.   (kommen)

[b] Er _____ in Neu Delhi.(Wohnen)

[c] Wir _____ Musik.   (hören)

[d] Ich _____ English.   (sprechen)

[e] Ihr _____ Kinder.   (sein)

[f] Ich _____ eine Pizza.   (essen)

[g] Sie _____ cola.   (trinken)

[h] Du _____ Shivani.   (heißen)

[i] Ich _____ 18 jahre alt. (sein)

[j] Ich _____ zwei Brüder. (haben)

Q.3 Bilden sie die satze (5)

(Frame the sentences)

[a] Kartik / Name / Mein / ist

[b] sie / wie / heißen ?

[c] Ball / ist / ein / Das

[d] verheiratet / bin / ich

[e] vorname / priya / ist / Mein

(5)

Q.4 Antworten sie die Fragen

(Answer the questions ?)

[a] Wie heissen sie ?

[b] Wo wohen sie ?

[c] Was sind sie von Beruf ?

[d] Welche Hobbys haben sie

[e] Welche SPRACHE sprechen sie ?

(10)

Q.5. Stellen sie sich vor (10)

Q.6 Write the meaning of following words :-

[a] der Apfel

[b] der Milch

[c] der Stuhl

[d] der Kuchen

[e] der Tisch

[f] die lampe

[g] das Buch

[h] die Bananen

[i] die Schocolade

[j] die Kartoffeln

Total no. of pages: 1

First Semester

SUPPLIMENTARY EXAMINATION

Time: 2:00 Hours

— 161 —

Roll No.............

B. Tech.

February- 2019

FEC46   Technical Communication

Max. Marks: 50

Note: Answer *All* questions.
        Assume suitable missing data, if any.

Q1. Write short notes on **any two** of the following: **20**

  a) Types of Business letters.
  b) Merits of written communication.
  c) Agenda of Meeting.
  d) Postscript.

Q2. Describe the elements of a business letter.   **10**

<center>**or**</center>

As Secretary of the Okhla Estate Industrialists' Union, New Delhi write a letter to the chairman TPDDL, to ensure regular supply of electricity.

Q3. How would you distinguish a resume from a C.V? Write a note on different parts of a good resume.   **10**

Q4. What do you understand by 'Netiquettes'? What points will you bear in mind while writing an e-mail to a business organization?   **10**

<center>******</center>

FIRST SEMESTER   B. Tech
SUPPLEMENTARY EXAMINATION   FEB – 2019

FEC-7 INTRODUCTION TO ENVIRONMENTAL SCIENCES

Duration: 2 Hours   Maximum Marks: 4

Note: Answer ALL questions. All questions carry equal marks.
          Assume suitable missing data, if any.

Q.1. Answer ALL the following questions:
   a. Define pollution and enlist any five – water pollutants.
   b. Write a note on rainwater harvesting.
   c. Enlist five institutions and five people engaged in Environmental
      Protection.
   d. What is global warming? Enlist five greenhouse gases (GHGs).
   e. Discuss the role of public awareness in environmental pollution.

Q.2. Attempt any TWO questions out of the following:
   a. Track the resources, waste products, disposal, and pollutants generated
      throughout the lifecycle of a laptop.
   b. Write a note on causes, effects and control measures for air pollutant -
      Ozone.
   c. Discuss sources of energy and how to reduce their use?

Q.3. Attempt any TWO questions out of the following:
   a. Discuss the effects of over-utilization and pollution of hydrosphere.
   b. Write notes on Ozone-layer depletion and Ozone Hole.
   c. Discuss the causes of destruction of ecosystems.

Q.4. Attempt any TWO questions out of the following:
   a. Discuss the role of renewable sources of energy.
   b. Discuss the effects of air pollution on plants and animals.
   c. Explain
        i. Thermal Pollution
        ii. Marine Pollution

Q.5. Attempt any TWO questions out of the following:
   a. Discuss the functions of forest in the environment.
   b. Discuss role of disaster management in environmental protection.
   c. Discuss the problem associated with the use of chemical fertilizers.

— 163 —

Total No. of Pages 01

Third SEMESTER

SUPPLEMENTARY EXAMINATION

MG-201 Fundamentals of Management

Roll No. ......

B.Tech (ODD Sem)

Feb. -2019

Time: 3:00 Hours **Max. Marks: 50**

Note:. Answer any five questions. Assume suitable missing data, if any. All Questions carry equal marks.

1) "No organization can achieve its objectives without systematic planning." Do you agree with this statement? Give reasons in support of your answer.

2) What is the meaning of organization structure? Also explain the merits and demerits of Functional and divisional structure.

3) Financial management is based on three broad financial decisions. What are these and also explain in brief the importance of these?

4) Define marketing? How is it different from selling? A salesman approaches you to promote the sales of a water purifier. Which communication tool is the marketer using by sending him to your doorstep? Also explain five characteristics of a good salesman?

5) "Your success as a manager will depend in part on your mindset concerning knowledge and the way it is handled". Comment.

6) Discuss the functions of Financial Markets? Also explain the difference between Primary market and secondary Market?

_____XXXXX_____

6(a) Discuss salient features of the Indian economy.   5

6(b) Consider following cash flow diagram. Calculate the total amount received at the end of the 15th year at the interest rate of 11%, compounded annually.   5

```
  1     2    3    4
                              15th Yr
  |     |    |    |            |
        |    |    ↓            |
        ↓    ↓                 ↓
     11500  11000, 10500  and so on
12,000
```
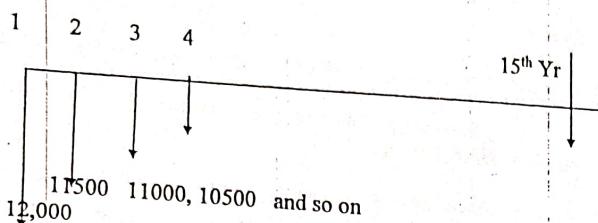
7(a) Discuss Business Risk which you will consider while deciding location for your foreign venture.   5

7(b) Two years ago, a machine was purchased at a cost of Rs. 4,00,000 to be useful for ten years. Its salvage value at the end of its life is Rs. 60,000. The annual maintenance cost is Rs. 60000. The market value of the present machine is Rs. 320000. Now a new machine to cater to the need of the present machine is available at Rs. 3,80,000 to be useful for eight years. Its annual maintenance cost is Rs. 45000. The salvage value of the new machine is Rs. 40000. Using an interest rate of 11%, find whether it is worth replacing the present machine with the new machine?   5

4

Total Number of Page-4

Roll No.----------------------

THIRD SEMESTER

Supplementary End-Semester Examination   B. Tech.

HU- 201: Engineering Economics   Feb-2019

Time: 3 Hour

Note: Answer Any Five questions,   Max. Marks: 50
Assume suitable missing data, if any

1(a) Discuss in detail Price Elasticity and Cross Elasticity of Demand. Also discuss their relevance in business.   5

1(b) In the design of a jet engine part, the designer has a choice of specifying either an aluminum alloy casting or a steel casting. Either material will provide equal service, but the aluminum casting will weigh 1.2 Kg. as compared with 1.35 Kg. for steel casting. The aluminum can be cost Rs. 80.00 per Kg. and the steel one for Rs. 35.00 per Kg. The cost of machining per unit is Rs. 150.00 for aluminum and R. 170.00 for steel. Every Kilogram of excess weight is associated with a penalty of Rs. 1300 due to increased fuel consumption. Which material should be specified and what is the economic advantage of the selection per unit?   2

1(C) The chief engineer of refinery operation is not satisfied with the preliminary design for storage tanks to be used as part of a plant expansion programme. The engineer who submitted the design was called in and asked o reconsider the overall dimensions in the light of an article in the "Chemical Engineer", entitled "How to size future process vessels"?   3

The original design submitted called for 4 tanks 5.2 m is diameter and 7 m in height. From a graph of the article the engineer found that the present ratio of height to diameter of 1.35 is 111% of the minimum cost and that the minimum cost for a tank was when the ratio of height to

P. T. O.

1

diameter was 4:1. The cost for the tank design as originally submitted was estimated to be Rs. 9,00,000. What are the optimum tank dimensions if the volume remains the same as the original design? What total savings may be expected through the redesign?

2(a) If you are CEO of a company, discuss factors which you will consider while deciding price of your product in the market.   5

2(b) What amount of money saved today will yield Rs. 40,000/- in third year and Rs. 55,000/- after five year at the 12% rate of interest compounded annually.   2

2(c) A company has to replace a machine in the production line after 11 years at the cost of Rs. 60,00,000/-. It plans to deposit an equal amount at the end of every year for the next 11 years at an interest rate of 11 per cent which is compounded annually. Find the equivalent amount that must be deposited at the end of every year for next 11 years.   3

3(a) Discuss the nature of soft drink market in India. What incentive may be given by the Government to encourage Indian producer?   5

3(b) Below is given a demand equation;   2

$$Q = -6P + 4000$$

Calculate price elasticity of demand if price is (i) Rs. 4 (ii) Rs 10 and (iii) Rs. 15. Is the demand at these prices elastic or inelastic?

3(c) The market supply and demand functions for deluxe pizzas in a small town are given by   3

Demand $Q = 100 - 3.5\,P$

Supply $Q = 15 + 1.5\,P$

i. Determine the equilibrium price and quantity.

ii. If the city Government levies a tax of Rs. 3.00/pizza on the pizza parlor, determine the

2

new equilibrium price and quantity of pizza

4(a) What do you mean by Production Process? How it has changed in the era of Information and Communication Technology   5

4(b) A Company wants to deposit money to create an R&D reserve. The company will get 15,00,000 every year for next 15 years for R&D. The reserve will grow at the rate of 12 per cent annually. Find out the single payment which should be made now.   5

5(a) Environmental problems are macro level problems. Discuss the role of appropriate technology in this regard. Also suggest framework to impose taxes to control environmental hazards.   5

5(b) A firm, Prime Manufacturing is planning to expand its production operation. It has identified three machines which are technologically capable to serve the purpose. The initial outlay and annual revenues with each of the machines are given below: 5

	Initial Outlay (Rs.)	Annual revenue	Life (in years)	
Machine I	Rs. 5,45,000	Rs. 2,50,000	15	
Machine II	Rs. 6,14,000	Rs. 3,30,000	12	
Machine III	Rs. 6,00,900	Rs. 3,50,000	10	

If the rate of interest is 12%, which machine the company should opt for? Find out the result by Present Worth method.

3

Total No. of Page:1

Roll No. ......

FIFTH SEMESTER

SUPPLEMENTARY EXAMINATION

B.Tech. (Mrng]

Feb-2019

Time: 3 Hours

HU-303 Professional Ethics & Human Values

Max. Marks : 50

Note : Attempt Any Five Questions

(5x10=50Marks)

Q1. Explain tha major problems of environmental ethics. List the steps to overcome the problems associated with the environment.

Q.2. Define the term professionalism. Explain the characteristics and responsibility of a professional.

Q3. Discuss the main aspects of harmony in life(personal, social, family, nature).

Q4. What is an 'Engineering Ethics'. What are the ethical issues in Engineering Ethics?

Q.5. Explain the benefits and harms of science and technology.

Q.6. Define the codes of ethics for engineers. Also state the importance of following these codes.

Q.7. Explain the difference between three ethical theories- Utilitarianism, Virtue theory, deontology.

Q.8. What is Ethics? Explain the importance of ethics in the society.

END

Total No of Pages 01   Roll. No....................

SIXTH SEMESTER — V   **B.TECH**

SUPPLEMENTARY EXAMINATION   Feb.2019

HU301   TECHNICALCOMMUNICATION

Time: 3.00 Hours   Max.Marks: 50

| Note: Answer all the questions |
| Assume suitable missing data, if any. |

1. Write short notes on any two of the following: 10

a) Types of report

b) Body language

c) Interview skills

2. As the sales manager of the ABC Company, draft a reply in the form of an e mail for two customers who have complained about your product. Imagine necessary details and justify your stand.   10

3. The topic given to you in a GD is "All-is-not-well-with-our-technical education".

a) Analyze the faults of our technical education system

b) Give recommendations and defend the points highlighted by you.   10

4. Write a resume for the post of assistant engineer in XYZ Company.   10

5. Discuss the importance of professional communication in an organization.

                                                                 10

END

IT-201   DATA STRUCTURES

Time: 3:00 Hours   Max. Marks: 40

Note:	Answer any five questions.
	Assume suitable missing data, if any.

Q.1.

a) Explain the average case complexity of Merge Sort.   [3]

b) Explain the procedure to convert infix to postfix expression and evaluate the following postfix expression 7 3 4 + - 2 4 5 / + * 6 / 7 +?   [5]

Q.2.

a) Write an algorithm to find the 3rd elements from the end in a linked list in one pass.   [4]

b) Write the difference between Stack and Queue. Also explain all the operations on Queue data structure.   [4]

Q.3.

a) Assuming that priority queue is implemented using the linked lists where a master list contains a pointer to the corresponding priority list. Write a function to insert an element x of priority p into this queue.   [4]

b) Write a program to implement stack using singly linked list.   [4]

Q.4.

a) What are the advantages of Complete Binary tree? Explain the operations of Complete Binary tree with suitable example.   [4]

P.T.O

b) Write an algorithm for heap sort. Discuss its complexity. For the following key sequence determine the binary heap obtained when the keys are inserted one by one in the order given into an initially empty heap and perform heap sort: 9, 91, 74,58, 45, 11, 76, 40, 98, 15. [4]

Q.5.

a) How we can represents the graph explain? Write Depth First Search (DFS) algorithm for traversing a graph. [4]

b) What are the advantages of hash tables? Explain with a suitable example. [4]

Q.6. Write short notes on any four: - [4x2]
   a) Binary Search
   b) Threaded trees
   c) Collision resolution techniques
   d) Spanning Tree
   e) External Sorting

-END-

Total No. of Pages –1   Roll No...........................

III SEMESTER   B.Tech.[IT]
SUPPLEMENTARY PAPER   (FEB-2019)
IT 203 OBJECT ORIENTED PROGRAMMING
Time:3hrs.   Max. Marks: 40

Note: **Q1** is compulsory. Attempt any **FOUR** out of the rest.
Assume suitable missing data, if any.

Q1. Answer the following   2x6
a) Write a program to find the length of a string using operator overloading
b) Differentiate between Java application vs applet
c) Differentiate between Call by value vs call by reference
d) Differentiate between Class and structure
e) What is dynamic and static binding in C++?
f) What is the role of :: in inheritance?

Q2. a) Explain the methods to overload operators. Why is it required? Overload the << and >>
operators.   3
b) What is a friend function? Explain the concept of friend function and friend class in detail with an
example. Also discuss inheritance in case of a friend function giving reasons for your answer.   4

Q3 a) Write a program to declare a class 'student', consisting of data members roll_no and stud_name. Write
the member functions accept() to accept and display() to display the data for 10 students.   3
b) What is java applet? Give its properties in detail. Give an example of the same by creating a basic
applet which will print the string "Hello User" on the screen.   4

Q4. Answer the following with examples
a) "Java is a pure object oriented programming language". Explain   3
b) Write a program to show the use of virtual base class.   4

Q5. Answer the following with examples.
a) What is the role of a nested class? How to use it?   3
b) How does runtime polymorphism occur in C++?   4

Q6 a) Write a program to show the role of this keyword in C++. Explain.   3
b) Explain exception handling in C++. How is an exception rethrown? Also explain the concept of
multiple catch and catch all.   4

Q7 a) Explain templates and its types with detailed example.   3
b) What is initialiser list and discuss its role in constructor calls in multilevel inheritance in C++ with
examples.   4

–END–

Total No. of Pages - 2

Roll No.........

THIRD SEMESTER
SUPPLEMENTARY EXAMINATION
IT-205 DISCRETE STRUCTURES

B.Tech. (IT)
(Feb-2019)

Time:3 Hours

Max. Marks: 50

Note:	Answer all questions.
	Assume suitable missing data, if any.

1. Answer the following questions. Each question carries 2 marks.

(a) Construct a truth table for $(p \leftrightarrow q) \leftrightarrow (r \leftrightarrow s)$.

(b) What is Selection Sort? Explain with an example.

(c) Translate in two ways each of these statements into logical expressions using predicates, quantifiers, and logical connectives. First, let the domain consist of the students in your class and second, let it consists of all people.
  (i) Everyone in your class has a cellular phone.
  (ii) Everyone in your class is friendly.

(d) Explain the principle of inclusion and exclusion. Give a formula for number of elements in the union of four sets.

(e) Obtain Disjunctive normal form of $\neg(p \wedge q) \leftrightarrow (p \vee q)$

2. Answer the following questions. Each question carries 3 marks.

(a) Explain Isomorphism of graphs with suitable examples.

(b) What is depth first search. Write its algorithm.

(c) Use proof by cases to show that $|xy| = |x| \, |y|$, where x and y are real numbers.

(d) The Indian Cricket team consists of 16 players. It includes 2 wicket keepers and 5 bowlers. In how many ways can a cricket team of eleven players be selected if we have to select 1 wicket keeper and atleast 4 bowlers?

(e) Explain pigeonhole principle. Show that for every integer n there is a multiple of n that has only 0s and 1s in its decimal expansion.

3. Answer the following questions. Each question carries 5 marks.

(a) What is Quicksort? Explain with an example. Apply the Quicksort on the following data

44,33,11,55,77,90,40,60,99,22,88,66

P.T.O

(b) Explain the principle of mathematical induction. Consider the sequence $a_0, a_1, a_2, \ldots$ defined by $a_0 = 1/4$ and $a_{n+1} = 2\,a_n(1 - a_n)$ for $n \geq 0$. A formula for the sequence a_n defined above, is

$$a_n = (1 - 1/2^{2^n})/2, \ \forall n \geq 0.$$

Prove that the recursive formula is true by using proof by mathematical induction.

(c) Use Kruskal's algorithm to find a minimum spanning tree for the given weighted graph.

(d) Write the inorder, preorder and postorder for the following tree.

(e) Use a K-map to find a minimal expansion as a Boolean sum of products of each of these functions

(i) $wxy\bar{z} + wx\bar{y}\bar{z} + w\bar{x}yz + w\bar{x}y\bar{z} + w\bar{x}\bar{y}\bar{z} + \bar{w}xyz + \bar{w}xy\bar{z} + \bar{w}\bar{x}y\bar{z} + \bar{w}x\bar{y}z + \bar{w}xy\bar{z} + \bar{w}xyz$

(ii) $wx\bar{y}\bar{z} + w\bar{x}yz + w\bar{x}y\bar{z} + w\bar{x}\bar{y}\bar{z} + \bar{w}x\bar{y}z + \bar{w}xy\bar{z} + \bar{w}xyz$

-END-

Total No. of Pages: 02
THIRD SEMESTER
END SEMESTER EXAMINATION
(Supplementary Examination)

Roll No..._____
B.Tech. (IT)
February-2019

IT-207- ENGINEERING ANALYSIS AND DESIGN (MODELLING & SIMULATION)

Time: 03 Hours   Max. Marks: 50

> **Note:** Attempt total *FIVE* questions.
> Assume suitable missing data, if any.

Question No. 1   [2x5=10]

[a] What is significance of mean, mode and median of a data distribution?
[b] Define simulation? And discuss when study via simulation is appropriate.
[c] What are the applications areas of simulation?
[d] Describe the component of the system.
[e] What is limitation of mid square method of generation of random number sequences.

Question No. 2   [5x2=10]

[a] Compare the simulation techniques with the analytical methods to study a system.
[b] Explain an inventory model defining all decision variables.

Question No. 3   [2x5=10]

In a random number generation process, there are two unbiased dice and these are thrown multiple times. Find the probability that

[a] The first dice shows 6
[b] Both digit drawn are odd.
[c] Total sum of numbers on dice is 8.
[d] First digit is odd
[e] Both the dice show the same number of digit

Question No. 4   [5x2=10]

[a] A machine produces 20 % products defective and determine the probability that out of 4 product chosen at random (i) 1 (ii) 0 (iii) less than 2 products will be defective?

[b] The mean height of 1000 students is 42 and standard deviation is 24. Find the number of students exceeding a height of 50.

Question No. 5   [10]

A confectioner keeps stock of product brand of cake and previous data for daily demand is given as:

Table 1: Distribution for demand

Demand	0	10	20	30	40	50
Probability	0.01	0.20	0.15	050	0.12	0.02

The sequence of random number is given as 48, 78, 19, 51, 56, 77, 15, 14, 68, 9. Using the above demand distribution simulate the demand for next 10 days and find the average daily demand.

Question No. 6   [5x2=10]

[a] Generate a 10 random number sequence using mid square method the seed value is 4168.
[b] A random number generator generates six number sequences such as 0.4, 0.81, 0.14, 0.05, 0.93 and 0.12. Test the uniformity of generated random number sequences using Kolmogorov–Smirnov test with significance level 0.02. Kolmogorov–Smirnov distribution Table is given below, where n and α are the degree of freedom and significance level respectively.

n\ α	0.001	0.01	0.02	0.05	0.1	0.15	0.2
1		0.99500	0.99000	0.97500	0.95000	0.92500	0.90000
2	0.97764	0.92930	0.90000	0.84189	0.77639	0.72614	0.68377
3	0.92063	0.82900	0.78456	0.70760	0.63604	0.59582	0.56481
4	0.85046	0.73421	0.68887	0.62394	0.56522	0.52476	0.49265
5	0.78137	0.66855	0.62718	0.56327	0.50945	0.47439	0.44697
6	0.72479	0.61660	0.57741	0.51926	0.46799	0.43526	0.41035
7	0.67930	0.57580	0.53844	0.48343	0.43607	0.40497	0.38145

Total No. of Pages _02__   Roll No. ......

_Fifth__ SEMESTER   **B.Tech [IT]**

          (Reappear)

Supplementary

~~END-SEMESTER~~ EXAMINATION   **Feb-2019**

IT 301 THEORY OF COMPUTATION

Time: 3:00 Hours   Max. Marks : 50

> Note : Answer **any five** questions out of seven
>   Assume suitable missing data, if any.

Q.1 State the Pumping Lemma for context free languages. Apply this
Lemma for determining whether the following language is context
free or not.
$$L=\{a^n b^m c^{2n}; m,n>0\} \qquad (10)$$

Q.2 For the following grammar productions of a language L,

$S \rightarrow AB$

$A \rightarrow AD$

$D \rightarrow ab$

$B \rightarrow c$

$A \rightarrow d$

a) Write the alphabet of this grammar.
b) For any one example string that is a member of this language,
conduct the CYK membership test to verify that this string is indeed
generated by this grammar.

c) Convert the given grammar into Greibach Normal Form
d) Convert the given grammar into Chomsky Normal Form
          (1+5+2+2)

Q.3 Construct the Turing Machine that can perform addition of two
numbers. Construct both the state diagram and the state table.
          (10)

Q.4 Construct a Push Down Automata that accepts the language
$L=\{a^n c^{3n+2}; n>0\}$. Trace a sample string through this machine.
          (10)

Q.5 For the grammar: $S \rightarrow aT$ $T \rightarrow cT$ $T \rightarrow aS$ $S \rightarrow a$
a) Define the language generated by this grammar
b) Construct the DFA for this language
c) Write the derivation for any one sample string that belongs to this
language.
          (2+5+3)

Q.6 a) Prove the closure properties of context free languages using an
example each.
b) Differentiate between recursive and recursively enumerable
languages using examples.
          (5+5)

Q.7 Explain the following in brief using a suitable example each:
[a] Context sensitive grammar and its automata
[b] Closure property for regular languages
          (5+5)

Total no. of pages: 02

FIFTH SEMESTER

END SEMESTER EXAMINATION

(Supplementary Examination)

Roll _____

B.Tech. (IT)

FEBRURARY 2019

IT-307 PATTERN RECOGNITION

TIME: 3 Hours   **Max. Marks: 40**

> **Note:** *Attempt any FIVE questions.*
> *Assume suitable missing data, if any.*

Question No. 1   [4x2=8]

[a] What are the fundamental steps of pattern recognition system? Discuss and demonstrate with suitable diagram.

[b] What are the applications of pattern recognition and how it enhances the life of a human beings?

Question No. 2   [4x2=8]

Let us consider a situation where each of the 3 classes is separable from other by a single decision boundary. How one can determine class membership of a pattern to any of these 3 classes. The decision boundary is as given:

$$d_i(x) = \begin{cases} -x_1 - x_2 + 5 = 0 & for\ i = 1 \\ -x_1 - 2 = 0 & for\ i = 2 \\ -x_1 - 2x_2 - 2 = 0 & for\ i = 3 \end{cases}$$

Also test the pattern vector (5, 3) and (9, 3) to belong to which class.

Question No. 3   [4x2=8]

What is distance based classifier? Consider the following training patterns:

Pattern	Features	Class
x_1	(3,0)	1
x_2	(4,1)	1
x_3	(3,2)	1
x_4	(1,-1)	2
x_5	(1,-2)	2

Classify the input feature vector $x = (1,1)$.

Question No. 4   [4x2=8]

[a] Define the following terms: prior probability, posterior probability, likelihood ration.

[b] What are the fundamental features and also discuss the characteristics of feature?

Question No. 5   [4x2=8]

[a] What is activation function? Discuss different types of activation function used in artificial neural network.

[b] What is Multilayer Neural Network? And discuss the process of learning in Multilayer Layer Perceptrons (MLP).

Question No. 6   [2x4=8]

Write short notes on the followings:

[a] Support vector machine

[b] Principal Component Analysis

[c] Linear discriminant Analysis

[d] Singular value decomposition

Roll No. ......

Total No. of Pages

B.Tech. [I.T.]

FIFTH SEMESTER   (Supplementory)

(FEBRUARY-2019)

END SEMESTER EXAMINATION

IT-321 MALWARE ANALYSIS

Max. Marks: 50

Time: 3 Hour

Note: Attempt any **five** questions. Assume suitable missing data, if any.

Q1. What is static analysis. Explain different type of techniques to perform static analysis(atleast three).   [10]

Q2. How to use OllyDbg tool effectively for dynamic analysis. Explain its unique features and powerful capabilities to analyse.   [10]

Q3. (i) What is windows API. Explain the types and core components of windows API with example.
    (ii) Explain the difference between windows registry and windows API   [5+5]

Q4. What are packet sniffers used for. Explain how **wireshark** tool does packet sniffing including its advantages and disadvantages.   [10]

Q5. What is android malware. Explain plankton malware with its special characterstics.   [10]

Q6. What is the purpose of virtual snapshot manager in malware analysis . How can one connect a virtual machine to internet using VMware.   [10]

Q7. Explain the following:
  i.   downloaders and launchers
  ii. rootkits
  iii. kernel vs user mode
  iv. packing and unpacking

   [2.5*4]

Total No. of Pages _02_   Roll No. ......

Seventh SEMESTER   **B.Tech [IT]**

Supplementary   **[Reappear]**

~~END-SEMESTER~~ EXAMINATION   **Feb-2019**

IT-425   NATURAL LANGUAGE PROCESSING

Time: 3:00 Hours   Max. Marks : 50

> Note : Answer **any five** questions.
> Assume suitable missing data, if any.

Q.1 Explain the following terms in brief with an example.
   a) Word sense disambiguation
   b) Auxiliary verbs
   c) Morphology
   d) Phonetics
   e) WORDNET

(2x5)

Q.2   Demonstrate using an example for test and training corpus, the application of different distance and similarity formulae used to classify text in the test corpus.   (10)

Q.3 Given the following grammar and lexicon for generating sentences:

1. S→NP VP	4. NP→Det Adj N	N→cat|fish|man	Adj→old|small
2. NP→Name	5. VP→V	Name→Jack	Det→The
3. NP→Det N	6. VP→V NP	V→ate|cried	

Demonstrate Top-Down parsing in tabular form for the sentence "The small fish cried the old man"   (10)

Q. 4 What are bigram, unigram and trigram? Explain using examples how they could help in the classification of text for sentiment analysis.   (10)

Q. 5 a) What is Augmented Transition Network (ATN)? Describe its use with an example.
   b) What are the different features that could be extracted from text. Describe each with relevant formulae.   (5+5)

Q. 6 a) Describe unification of features using suitable example.
   b) What is probabilistic CFG. Explain using an example.   (5+5)

Q.7 Explain the following in detail
   [a] Logistic regression classifier and how it can be applied to text
   [b] Any one modern application of NLP   (5+5)
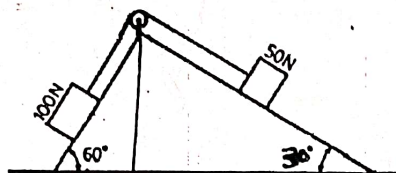
1

2

Fig. 6

(b) A ball dropped from the top of tower 30 m high. At the same instant a second ball is thrown upward from the ground with an initial velocity of 15 m/sec. When and where do they cross and with what relative velocity. [4]

-END-

Total no. of pages: 4   Roll No._____

THIRD SEMESTER   B.Tech. (AE)
SUPPLEMENTARY EXAMINATION   FEB 2019

AE-201,   Engineering Mechanics

Time: 3:00 Hour   Max. Marks: 40

Note: 1. Attempt any five questions.
2. Assume missing data, if any

Q-1 (a) State and prove the Varignon's theorem. [4]

(b) Two spheres weighting 60 N and 100 N are connected by a flexible string AB and rest on the mutually perpendicular planes PQ and QR as shown in Fig.-1. Find the tension in the string which passes freely through slots in smooth inclined planes PQ and QR. [4]
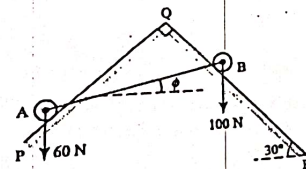

Fig.-1

Q-2 (a) Explain the different types of force systems. [4]

(b) Determine the reaction at the support at A, B, C, D as shown in Fig.-2 [4]
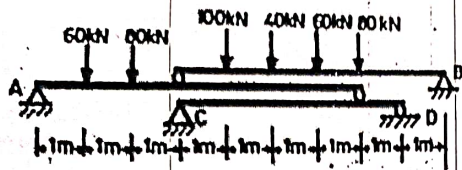
→P.T.O

Fig-2

Q-3 (a) Explain parallel shifting of force. [2]

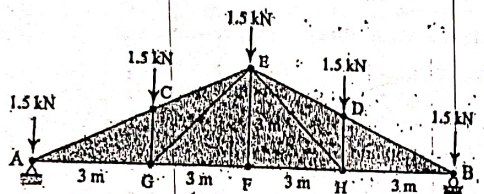(b) Determine the forces in the truss as shown in Fig.-3. [6]

Fig-3

Q-4 (a) Define angle of friction and angle of repose. [4]

(b) Two blocks connected with a tie rod are shown in Fig.-4. If $\varphi_B=15^0$ and $\mu_A=0.40$, find the smallest value of W for the equilibrium of the system. [4]
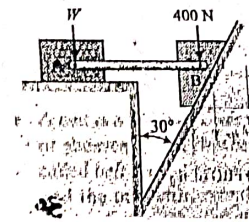
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Fig.-4

Q-5 (a) Differentiate between work done and virtual work done. [4]

(b) Draw SFD and BMD of the load diagram as shown in Fig.-5. [4]
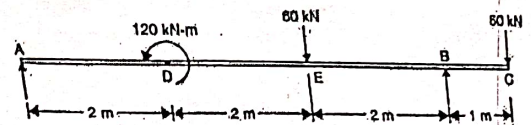

Fig.-5

Q-6 (a) Two rough planes inclined at 30^0 and 60^0 to the horizontal are placed back to back as shown in Fig.-6. The blocks are connected by a string running parallel to the planes and passing over frictionless pulley. Coefficient of friction is 1/3. Find the resulting acceleration and tension in the string. [4]

P.T.O

Total No. of Pages 1

Roll No ......

THIRD SEMESTER
SUPPLEMENTARY EXAMINATION

B. Tech [AE]
[FEB. 2019]

AE-205 MANUFACTURING MACHINES

Time: 3.00 Hrs

Max. Marks: 40

> **Note:** Answer any **FOUR** questions. Assume suitable missing data, if any.

1[a] Sketch and explain the automatic feed mechanism of a centre lathe. 5

[b] What are the common mechanisms causing wear of a single point cutting tool? Also discuss crater wear and flank wear. 5

2[a] With a neat sketch explain the working of the crank and slotted link mechanism of a shaper. How are the length of stroke and position of stroke adjusted on this shaper? 5

[b] With the help of a neat sketch explain the working of a plain, external cylindrical grinder. 5

3[a] What are common operations which can be performed on a drilling machine? With neat sketches discuss them briefly. 5

[b] What is a twist drill? Sketch various views of a standard RH twist drill and explain its various elements and angles 5

4[a] List various milling operations Also sketch and discuss the following milling operations.
(i) Face milling (ii) Straddle milling 5

[b] Classify milling cutters. With neat sketches discuss any two of them. 5

[5] Write short notes on the following [*Any Four*]
(i) Capstan and turret lathe
(ii) Unconventional machining
(iii) Lapping and honing
(iv) Specification of a grinding wheel
(v) Cutting tool materials 10

SUPPLEMENTRY EXAMINATION
February- 2019

BTECH – AUTO. ENGG
AE-207 Engineering Analysis and Design

Max. Time 3 Hr.   Max. Marks 40

Note: Answer ANY FIVE questions.
All questions carry equal marks.
Answer to each question must start on a fresh page.
Answers to all subparts of a question must be answered at one place.

Q.1 Write short notes on the following (Any FOUR)
a) Comfort and adaptability   b) Patentability
c) Geographical Indicator   d) Fishbone diagram
e) Biomimicry   e) Infringement of a patent

Q.2a. Explain the stages in the development of a product.
b. What do you mean by nature inspired innovations? Describe any three examples of nature inspired innovations.

Q.3a. Explain the systematic design procedure. Explain various stages in the engineering problem solving.
b. What do you understand by need, comfort and luxury? Describe suitable examples of each.

Q.4a. what are the different hats suggested by Edward De Bono for a brain storming session? Discuss their uses by a suitable example.
b. What do you understand by provocation and movement? Describe with a suitable example.

Q.5a. Explain the applications of Jugad innovation giving suitable examples.
b. Discuss the significance and the principles of ergonomics with a suitable example.

Q.6a. What are the principles of TRIZ innovation, Discuss the use of contradiction matrix.
b. Find the size and fit for a shaft and a hole of 30 $n6^{H7}$. If the fundamental deviation for shaft n is $5 D^{0.34}$ and the standard tolerance grades are as following: (standard tolerance $i = 0.45 \sqrt[3]{D} + 0.001D$) microns

tolerance grades	IT5	IT6	IT7	IT8	IT9	IT10	IT11	IT12
standard tolerance multiple	7i	10i	16i	25i	40i	64i	100i	160i

Diameter steps are 1-3, 3-6, 6-10, 10-18, 18-30, 30-50, 50-80, 80-120

(b) A small project is composed of 7 activities whose time estimates are listed in the table below,

Activity	Estimated duration (weeks)		
(i-j)	Optimistic	Most likely	pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

(i) Draw the network diagram of activities in the project.
(ii) Find the expected duration and variance of each activity. What is the expected project length?
(iii) Calculate the variance and standard deviation of the project length.

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END SEMESTER EXAMINATION (Supplementary)
FEB-2019

AE-309, Operations Research (Elective)

Time: 3:00 Hours   Max. Marks: 40

Note : Answer any FIVE questions.
All questions carry equal marks.
Assume suitable missing data, if any.

1. Write the dual of   [2+2+4]
(a)   Maximize Z= $3X_1 + 2X_2$ (b)   Maximize Z = $5X_1 - 6X_2 + 4X_3$
Subject to   Subject to
$X_1 + X_2 \geq 1$ $3X_1 + 4X_2 + 6X_3 \geq 9$
$X_1 + X_2 \leq 7$ $X_1 + 3X_2 + 2X_3 \geq 5$
$X_1 + 2X_2 \leq 10$ $-7X_1 + 2X_2 + X_3 \geq -10$
$X_2 \leq 3 X_1, X_1, X_2 \geq 0$ $X_1 - 2X_2 + 4X_3 \geq 4$
                                            $X_1, X_2, X_3 \geq 0$

(c) Solve the following LPP using simplex technique
Maximize Z = $100X1 + 50X2 + 50X3$
Subject To
$4X_1 + 3X_2 + 2X_3 \leq 1000$
$3X_1 + 8X_2 + X_3 \leq 800$
$4X_1 + 2X_2 + X_3 \leq 600$
$X_1, X_2, X_3 \geq 0$

2. (a) When is dummy required in transportation problem? Find the basic feasible solution and its cost by i) northwest corner method, ii) Least cost method and iii) Vogel's approximation method for the following transportation table which shows cost in rupees for transporting 1 unit from factories to warehouses.

1883 1

	Warehouses				
		A	B	C	D	Supply
Factories	X	2	3	11	7	6
	Y	1	0	6	1	1
	Z	5	8	15	9	10
Requirement		7	5	3	2	

(b) Consider the assignment problem shown in table below. In the problem 5 different jobs are to be assigned to 5 different machines such that the total processing time is to be minimized. The matrix entries represent processing times in hours. Solve above problem with Hungerian method. [4+4]

Jobs \ Machines	1	2	3	4	5
1	20	24	30	24	16
2	14	32	28	28	22
3	26	28	14	18	18
4	24	20	22	26	20
5	16	26	30	22	30

3. (a) Explain the terms w.r.t. queuing theory i) Balking ii) Reneging iii) Jockeying.

(b) At a reservation counter, 20 customers arrive on average every 10 minutes. The clerk can serve 22 customers in 10 minutes. Find i) average number of customers in the system ,ii) average queue length and iii) average time a customer waits before being served. State assumption made for the probability distribution. [4+4]

4. (a) Solve the below game theory problem with the concept of dominance method.

PLAYER A		PLAYER B			
		I	II	III	IV
	I	3	5	4	2
	II	5	6	2	4
	III	2	1	4	0
	IV	3	3	5	2

(b) Determine the solution of game for the pay-off matrix given below using graphical technique. [4+4]

PLAYER A		PLAYER B		
		I	II	III
	I	-3	-1	7
	II	4	1	-2

5. (a) The initial cost of a machine is Rs 71000 and scrape value is Rs. 1000. The maintenance costs found from experience are as below. Find when should the machine be replaced?

Year	1	2	3	4	5	6	7	8
Maintenance	2000	3500	5000	7000	10000	13000	17000	21000

(b) What is the need for Replacement of any machine? A machine was purchased with initial investment of Rs 40000. The following is the data available.

Year	1	2	3	4	5	6
Operating & Maintenance cost per year in Rs	1400	1450	1510	1600	1720	1900
Salvage Value in Rs	35000	34000	32500	30500	28000	25000

What will be the expected life as per optimum replacement policy and the average annual cost during this period? [4+4]

6. (a) The following table gives the duration in days and the predecessor for the various tasks. Draw the AON diagram and find the minimum time for completion of the project. Also find the total float for each activity.

Task	A	B	C	D	E	F	G	H	I
Time(days)	8	10	8	10	16	17	18	14	9
predecessor	-	-	-	A	A	B,D	C	C	E,G

Total no. of pages: 2

Roll No............

FIFTH SEMESTER

B. Tech.

SUPPLIMENTARY EXAMINATION

February- 2018

AE-307 COMBUSTION GENERATED POLLUTION

Time: 03 Hours

Max. Marks: 40

Note: All questions are compulsory.
Attempt any five question
Assume suitable missing data, if any.

1. What is fuel? Discuss different type of alternative fuels which affect global warming. List different type of emissions in diesel engine and discuss it in short. [8]

2. Explain why the constant volume combustion gives a higher indicated fuel conversion efficiency than constant pressure combustion for same compression ratio. [8]

3. List the commonly used alternative fuels, What are the performance parameters of the engine when use alternative fuel and discuss it in detail? [8]

4. What is biodiesel? Discuss the merits and demerits of biodiesel used in engine. [8]

5. What are the function of catalytic convertor? List the different performance parameters of the engine, and discuss it in detail. [8]

P.T.O

6. Explain the working principle of Stratified charged engines and non-dispersive infrared analyser. [8]

7. Explain in detail the formation of NOx in both S.I. engine sketch the variation of Nox concentration with equivalence ratio and explain the reason for the same. [8]

-END-

Total Number of Pages: 01

Roll No. ....

SEM.: FIFTH

B. Tech. Automobile Engg.

SUPPLEMENTARY EXAMINATION   Feb - 2019

Paper Code: AE - 311,   Course Title: Tyre Technology

Time: 3 Hours   *Max. Marks: 40*

Note: (i) Answer ALL questions. (ii) Marks are shown against each question.
(iii) Assume suitable missing data, if any.

Q.1 Answer all the following questions:
    [a]   What is the purpose of mandrel puncture test tyre?   [1.5]
    [b]   How tyre is designated?   [1.5]
    [c]   What is the aspect ratio?   [1.5]
    [d]   What is the field test performed on tyre on road?   [1.5]
    [e]   What do you mean by tyre maintenance?   [2]

Q.2 Attempt any TWO questions out of the following:
    [a]   Name the important parameters which can be measured by the laboratory test machines.   [4]
    [b]   Explain how you can increase the life of the tyre?   [4]
    [c]   Draw the neat sketch of tyre and label all its components.   [4]

Q.3 Attempt any TWO questions out of the following:
    [a]   What are the causes of tyre wear? Also write their remedies.   [4]
    [b]   Explain the different markings provided on the tyre.   [4]
    [c]   What is Proving Grounds, explain in brief.   [4]

Q.4 Attempt any TWO questions out of the following:
    [a] Name different compound mixing Equipment. Explain Mixing process.   [4]
    [b] What do mean by tyre Building process. Explain.   [4]
    [c] What are the materials used in tyre construction? Explain.   [4]

Q.5 Attempt any TWO questions out of the following:
    [a] Write the process of Static Balancing of Front Wheel.   [4]
    [b] What are the merits of tubeless tyre over tubed tyre?   [4]
    [c] What are the factors on which the load carrying capacity of the tyre Depends.   [4]

Total No. of pages: 2   Roll No.............

FIRST SEMESTER   **B.TECH [Iˢᵗ YEAR]**

SUPPLEMENTARY EXAMINATION   **FEB- 2019**
  ME 101;   **Basic Mechanical Engineering**
Time: 3:00 Hours   *Max. Marks: 50*

Note: Write **Part A** and **Part B** separately in the same answer book. Answer any **FIVE** questions from each Part. Assume suitable missing data, if any

<div align="center">

Part A

</div>

Q- 1): Define the followings –

   a)   Thermal equilibrium   (1)
   b)   Displacement work   (1)
   c)   First law of thermodynamics for a closed system undergoing a change of state   (1)
   d)   Zeroth law of thermodynamics   (1)
   e)   Flow work   (1)

Q-2) Derive the steady flow energy equation (SFEE). Apply this equation in compressor, nozzle.   (5)

Q-3a) Discuss the Kelvin-Planck and Clausius' statement of second law of thermodynamics.   (2.5)

Q- 3b) Write the similarities between heat and work.   (2.5)

Q-4a) State and prove the Pascal's law.   (2.5)

Q-4b: Explain: steady flow, unsteady flow, laminar flow, turbulent flow, compressible flow.   (2.5)

Q-5) Using suitable P-v and T-s diagram, explain the various processes of Diesel and Otto Cycle.   (5)

Q-6a)With the help of suitable diagram, explain the working of Pressurized Heavy Water Reactor.   (2.5)

P.T.O

6b) Explain the factors which are considered for selecting the site for hydro-electric power plant.

(2.5)

PART B

Q.7) Discuss any five properties of moulding sand.

(5)

Q.8) Write the advantages and limitations of casting process.

(5)

Q.9) With the help of neat sketches discuss the following sheet metal operations: (a) Blanking (b) Bending (c) Drawing

(5)

Q.10) Draw the schematic diagram of a lathe machine and discuss its important parts.

(5)

Q.11) Explain the working of the following welding processes with the help of neat sketches. Also Give the applications and advantages of each: (a) Shielded metal arc welding (SMAW)

(b) Resistance seam welding.

(5)

Q.12) Discuss with Figure (i) Mechanical comparator (ii) Vernier Height gauge

(5)

Q.13) Sketch and explain the following machining operations:
(a) Taper turning (b) Counter boring (c) Reaming
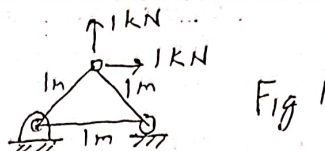
(5)

ME-201 MECHANICS OF SOLIDS
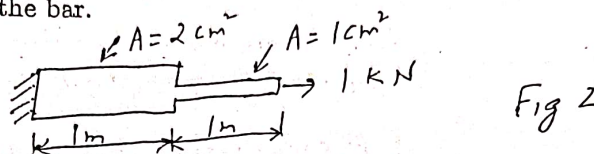
Time: 3 hrs

Max Marks : 40

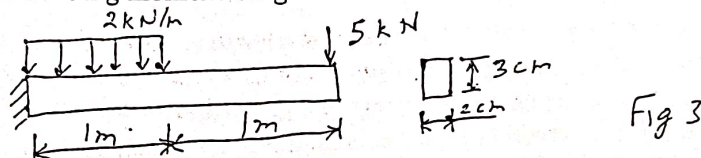Note: Answer any five questions.
All questions carry equal marks.

1(a) Calculate axial force in each bar of the truss shown in Fig. 1.

Fig 1

1(b) For the bar shown in Fig. 2, find the change in length when $E = 210$ G Pa. Find the strain energy stored in the bar.
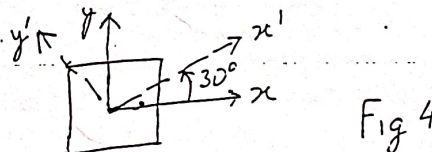

Fig 2

2(a) Draw shear force and bending moment diagrams for the cantilever shown in Fig. 3.

Fig 3

2(b) Find maximum bending stress in the beam in Q 2(a). Find equation of deflection curve of the beam.

3(a) A plane element (Fig. 4) is subjected to the stresses $\sigma_{xx}=5$ MPa, $\sigma_{yy}=10$ MPa, $\sigma_{xy}=5$ MPa. Find principal stresses and maximum shear stress existing in the element. Find $\sigma_{x'x'}$.

Fig 4

3(b) A hollow shaft of inside diameter equal to one-half of outside diameter is subjected to a torque of 35 kNm. If outside diameter of the shaft is 10 cm, find the maximum shear stress in the shaft. Find the twist in the shaft if length of shaft is 1 m and shear modulus is 70 GPa.

4(a) A pin-ended strut of aluminum (E=80 GPa) with length 3m is constructed of a circular tubing with outside diameter 100 mm and thickness 10 mm. Determine the Euler buckling load.

P. T-O

4(b) Find radial and tangential stresses at inner and outer radii in a thick cylinder of outer radius 0.5m and thickness 0.1m for an internal pressure 5 MPa. Find radial and tangential strains. Find dilation of the cylinder.

5(a) Derive Euler's buckling load for fixed-free column.

5(b) Derive expression for strain energy for bending of a circular rod.

6 Write short notes on any two:
(a) Theories of failure
(b) Stress-strain diagram of mild steel
(c) Theory of bending

Total no. of pages: 2

Roll No._____

THIRD SEMESTER

B. Tech (ME)

SUPLEMENTARY EXAMINATION

FEBURARY 2019

ME-207 ENGINEERING ANALYSIS AND DESIGN

Max. Marks: 40

Time: 3 Hours

Note: Attempt five questions in all. Question 1 is compulsory.
      Each question carries equal marks.
      Statistical table is allowed.
      Assume missing data , if any

1. Write short notes on the following:
   (a) Modeling of Mechanical System
   (b) Types of failure
   (c) Hypothesis testing
   (d) Computer aided engineering analysis

2. (a) What do you understand by engineering analysis? Discuss the steps followed in an Engineering Design processes.
   (b) Describe the important Ethical issues involved in the course of operating a business.

3. (a) Briefly discuss about Technical Report writing. Structure wise, what are the important parts of a Technical Report.
   (b) What are the important steps followed while preparing a Presentation?

4. (a) Describe the different Theories of Failure with neat diagram.
   (b) Design a cylindrical solid shaft made of Steel, for which the Maximum Normal stress should not exceed 140 N / mm^2 and its Maximum allowable Shear stress is 65 N / mm^2. The shaft is being operated by an Engine of 760 kw, running at 1400 rpm. Shaft is mounted by a Pulley over it, which is creating maximum bending moment of 3.5 kNm.

5. (a) Solve the following linear programming problem-

   Maximize $Z= 2x_1+x_2+x_3$
   Subjected to: $4x_1+6x_2+3x_3 \leq 8$
                       $3x_1 -6x_2 -4x_3 \leq 1$
                       $2x_1 +3x_2 -5x_3 \geq 4$
                       x_1, x_2 and $x_3 \geq 0$

   (b) A company manufactures two kind of machines, each requiring a different manufacturing techniques. The Deluxe machine requires 18 hours of labour, 9 hours of testing, and yield a profit of Rs 400. The Standard machine requires 3 hours of labour, 4 hours of testing, and yields a profit of Rs 200. There are 800 hours of labour and 600 hours of testing available each month. A marketing forecast has shown that the monthly demand for the Standard machine to be no more than 250. The management wants to know the number of each model to produce monthly that will maximize the total profit.

6. (a) A manufacturing firm has three plants at the locations A, B, C which supply to warehouses which are located at D, E, F, G, and H. Monthly plant capacities are 800, 500 and 900 units respectively. Monthly warehouses requirements are 400, 400, 500, 400 and 800 units respectively. Unit transportation cost (in Rs) are given below. Determine an optimum distribution for the company in order to minimize the total transportation cost.

P.T.O

	To				
	D	E	F	G	H
From A	5	8	6	6	3
B	4	7	7	6	5
C	8	4	6	6	4

(b) Solve the assignment problem represented by the matrix.

	1	2	3	4	5	6
A	9	22	58	11	19	27
B	43	78	72	50	63	48
C	41	28	91	37	45	33
D	74	42	27	49	39	32
E	36	11	57	22	25	18
F	3	56	53	31	17	28

7 (a) What do you understand by Poisson distribution. Derive the relationship for its mean and variance.

(b) An electrical firm manufactures lightbulbs that have a life, before burn out, that is normally distributed with mean equal to 800 hours and a standard deviation of 40 hours. find the probability that a bulb burns between 778 and 834 hours.

-END-

SUPPLEMENTARY EXAMINATION   *February -2019*

ME-261 Kinematic and Dynamic of Machines

Time: 3:00 Hours   Max. Marks : 40

> Note: Q. No. 1 is compulsory.
>   Attempt any *four* from the rest
>   Assume suitable missing data, if any.

Q.1 Answer any <u>six</u>   (6*2=12)

a) Explain Grubler's criteria for finding DOF of a body in space.

(b) Write a note on types of Kinematic pairs.

(c) Draw a turning moment diagram for a four stroke cycle I. C. Engine.

(d) Define Interference? How it is avoided.

(e) What do you meant by static and dynamic balancing?

(f) Write two inversion of Double slider crank mechanism.

(g) Define free vibrations and forced vibrations.

Q.2.   In a slider crank mechanism the crank is 500 mm long and   (7)
rotates at 20 rad/sec in the counter clockwise direction. the
length of connecting rod 2000mm .when the crank turns 60^0
from inner dead centre, determine the velocity of slider,
angular velocity of connecting rod and velocities of rubbing
at the pin of crankshaft and crank having diameter 80 and 60
mm respectively?

Q. 3 (a) Four masses m1, m2, m3, m4 are 200 kg, 300 kg, 240 kg and (3.5)
260 kg respectively. The corresponding radii of rotation are
0.2m, 0.15m, 0.25m and 0.3m respectively and the angle
between successive masses are 0^0, 45^0,75^0 and 135^0.Find the
position and magnitude of the balance mass required, if its
radius of rotation is 0.2 m?

(b) Two 20^0 involute spur gear meshes externally and give a (3.5)
velocity ratio of 3, module is 3 mm and addendum is equal to
1.1 module .if the pinion rotates at 120 rpm. Determine
minimum number of teeth on each gear to avoid interference
and number of pair of teeth in contact?

Q.4 (a) A vibrating system consists of a mass 4 kg, a spring having (3.5)
stiffness 2.5 N/mm and a damper co-efficient 0.020
N/mm/sec. Determine: i) Damping factor ii) Natural
frequency of damped vibration iii) Periodic time of damped
vibration iv) Logarithmic decrement v) Ratio of frequency of
damped and undamped vibration.

(b) Drive an expression for finding velocity and acceleration of
piston. (3.5)

Q.5 Draw the profile of a cam operating with roller follower (7)
having minimum radius of cam 25 mm, roller radius is 10
mm and a Lift of 30mm.The cam raises the follower for 120^0
with constant acceleration and deceleration followed by
dwell period of 60^0 and then the follower lower down during
next 110^0 of the cam rotation with simple harmonic motion
(SHM) and again followed by a dwell period. If the cam
rotates at 120rpm. Calculate maximum velocity and

acceleration of the follower during ascent and descent period.

Q.6 (a) An epicyclic gear train consists of three gears S, P & A .The (3.5)
gear A has 72 internal teeth and gear S has 32 external teeth.
Gear P mesh with both S&A and is carried on an arm 'a'
which rotates about the centre A at 20 rpm. If gear A is fixed,
determine the speed of gears S&P?

(b) A disc with radius of gyration 60 mm and has a mass of 4 kg (3.5)
is mounted centrally on a horizontal axle of 80mm length
between the bearing. It spins about the axle at 800 rpm
counter clockwise when viewed from the right hand side
bearing. The axle precesses about a vertical axis at 50 rpm in
clockwise direction when viewed from the above. Determine
the resultant reaction at each bearing due to the mass and the
gyroscopic effect?

END

Total No. of Pages- 2

Vth SEMESTER

Roll No. ......

B.Tech. [Mech.]

SUPPLEMENTARY EXAMINATION

Feb.-2019

ME301   Fluid Systems

Time: 3:00 Hours

Max. Marks : 40

Note: Answer all question by Selecting any two parts from each questions.
All questions carry equal marks.   Assume suitable missing data, if any.

Q.1[a] Derive and discus linear and angular momentum for control volume.

[b] A wind generator with a 9 m-diameter blade span has a cut-in wind speed (minimum speed for power generation) of 11 km/ at which velocity the   turbine generates 0.4 kW of electric power (Fig. 1). Determine (i) the   efficiency of the wind turbine generator unit and (ii) the horizontal force   exerted by the wind on the supporting mast of the wind turbine. What is the effect doubling the wind velocity to 22 km/h on power generation and the force exerted? Assume the efficiency remains the same, and tai the density of air to be 1.22 kg/m³.
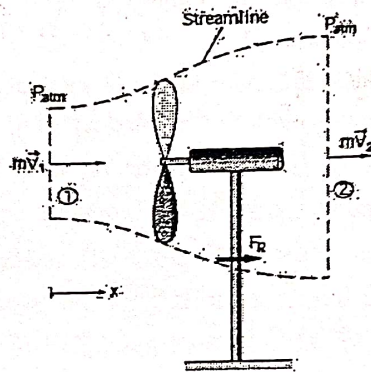

Fig.1

[c]   Derive an expression for condition of maximum fluid power transmission through pipe.

Q.2[a] Derive the specific speed of the turbine and how does it help in selecting turbine. .

[b] A Pelton wheels operate with a jet of 150 mm diameter under the head of 500 m. Its mean runner diameter is 2.25m an rotates with a speed of 375 rpm. The angle of bucket tip at outlet as 15° , coefficient of velocity is 0.98, mechanical lo equal to 3% of power supplied and the reduction in   relative velocity of water passing through bucket is 15%. Find (i) force of jet on the bucket,(ii) the power developed, (iii) bucket efficiency and (iv) the overall efficiency.

[c]A Francis turbine has a wheel diameter of 1.2 m at the entrance and 0.6 m at the exit. The blade angle at the entrance 90° the guide vane angle is 15°. The water at the exit leaves the blades without any tangential velocity. The available head is m and the radial component of flow velocity is constant. What would be the speed of the wheel in rpm and blade angle at exit? Ignore friction

Q.3[a] A Kaplan turbine operating under a net head of 20 m develops 16 MW with an overall efficiency of 80%. The diameter of runner is 4.2 m, while the hub diameter is 2 m the dimensionless specific speed is 3 rad. If the hydraulic efficiency is 9(calculate the inlet and exit angles of the runner blades at the mean blade radius if the flow leaving the runner is purely axia

P.T.C

[b] A Pelton wheel produces 300kW of power when working under a head of 180 m with a discharge of 0.2 m³/s. Compute the (a) hydraulic efficiency, (b) mean bucket speed, and (c) velocity of whirl at inlet and outlet. Take C_v =0.985, angle of deflection of jet = 165° and assume the relative velocity at exit remains unchanged till the exit at the bucket. Assume mechanical efficiency =1.0.

[c] Draw and explain main and operating characteristics of Kaplan turbine.

Q.4[a] The impeller of a centrifugal pump is 0.3 m in diameter and runs at 1450 rpm. The pressure gauges on suction and delivery sides show the difference of 25 m. The blades are curved back to an angle of 30°. The velocity of flow through impeller being constant, equals to 2.5 m/s, find the manometric efficiency of the pump. If the frictional losses in impeller amount to 2 m, find the fraction of total energy which is converted into pressure energy by impeller. Also find the pressure rise in pump casing.

[b] A single acting reciprocating pump having a cylinder diameter of 150 mm and stroke of 300 mm is used to raise the water through a height of 20 m. Its crank rotates at 60 rpm. Find the theoretical power required to run the pump and the theoretical discharge. If actual discharge is 5 litres/s, find the percentage slip. If delivery pipe is 100 mm in diameter and is 15 m long, find the acceleration head at the beginning of the stroke.

[c] A hydraulic ram pump receives 80 liter/s of water from a source under a head of 5.0 m and delivers 8.0 litre/s to a reservoir 15 m above the ram. The delivery pipe is 75 m long and has a diameter of 100 mm. The supply pipe is 12 long and is 200 mm in diameter. (a) Assuming a friction factor F = 0.025 for both the pipes, estimate the efficiency of the ram. (b) What would be the efficiency if the friction in the pipes are neglected?

Q.5[a] Explain Advantages of air vessels in reciprocating pump.

[b]Explain the need for CFD and its strategy.

[c] How does CFD deals with nonlinearity in Navier-Strokes equations.

Total No. of Pages_2

Roll No. ......

FIFTH SEMESTER

B.Tech (ME)

END SEMESTER EXAMINATION (Supplementary) Feb -2019

ME305 & Design of Machine Elements

Time: 3:00 Hours

Max. Marks : 40

Note : Answer any five questions.
All questions carry equal marks. Assume suitable missing data, if any. Design Data H/Book is allowed

Q.1 [a] Explain the procedure for selection of factor of safety for a connecting rod. [2]

[b] What are the factors responsible for selection of materials for a machine component? [2]

[c] Explain distortion energy theory of failure. [2]

[e] How localised stresses in machine component be avoided? Explain with diagrams. [2]

Q.2 A long thin pressure vessel of AISI1020 (Yield stress 350MPa) with 70mm internal diameter and 2.5mm thick is subjected to an internal pressure of 6MPa. If the cylinder is also subjected to a twisting moment of 70Nm, determine the factor of safety on the basis of Maximum Principal stress, Maximum shear and Distortion energy theory. Which theory of failure is better for this design? [8]

Q.3 A steel shaft of AISI1030 is subjected to a torsional moment that varies from 330 Nm clockwise to 110 Nm counter-clockwise and an applied bending moment at a critical section varies from +440 Nm to −220 Nm. The shaft is of uniform cross-section and no keyway is present at

P.T.O.

the critical section. Determine the required shaft diameter using Goodman and Soderberg criteria. The material has an ultimate strength of 550 MPa and a yield strength of 410 MPa. Take the endurance limit as 0.5 times the ultimate strength, factor of safety of 2, size factor of 0.85 and a surface finish factor of 0.62. [8]

Q.4 Design a simple cotter joint for an axial load of 100kN. Assume that all the parts are made of same material with permissible stresses of 70MPa, 50MPa and 90MPa in tension, shear and compression respectively. [8]

Q.5 A pair of spur gears is to transmit 20kW. The teeth are 15° full depth involute. The Cast steel pinion (σo=150MPa) is to drive a cast iron gear (σo=55MPa) at 450 r.p.m.. and the velocity ratio is 1:3. If the pinion is surface hardened to 270BHN determine the proper module, number of teeth and face width for these gears from the standpoint of strength, dynamic load and wear. Assume a first class commercial gear having an error of 0.07mm for which C=283kN/m. [8]

Q.6 Design a Bush-pin type flexible coupling for transmission of 30kW from a motor to a centrifugal pump at 1448rpm. The following data is given: Diameter of motor shaft=38mm, Diameter of pump shaft=30mm, No. Of bolts=6 nos. Allowable Shear stress for the bolts, keys and shaft=55MPa, Allowable shear stress for the flanges=12MPa. Assume crushing stress twice the shearing stress in all cases. [8]

Q.7 Design a triple riveted butt joint with zig-zag fashion with five rivets in one pitch length and with double cover plates of equal widths for a boiler drum. The thickness of the main plate is 15mm. The allowable tensile stress, compressive stress and shearing stress of the steel used are 75MPa, 100MPa and 58MPa respectively. The efficiency of the joint should not be less than 75%. Assume that the boiler plate and rivets are made of the same steel. [8]

END

Total No. of Page-01

Roll No....... ....

B.Tech. (ME)

FIFTH SEMESTER
SUPPLIMENTARY EXAMINATION

Feb.–2019

ME-307   Manufacturing technology – II

Time: 3:00 Hours

Maximum Marks: 40

Note: Answer ALL questions. Attempt any TWO parts of each question.

1 (a) What are the properties of cutting fluid?   4
   (b) Explain different types of cutting tool materials.   4
   (c) Explain the working of Photographic method of   4
   temperature measurement with a sketch.

2 (a) Explain Merchant Circle diagram and calculate   4
   different forces.
   (b) Explain Ernst – Merchant modified theory.   4
   (c) Name different types of stepless drives methods. Explain   4
   any one method.

3 (a) Explain the requirement of designing the spindle.   4
   (b) What is Sine Bar? Explain the method of measuring the   4
   taper angle with sine bar.
   (c) Sketch a three view diagram of HSS tool and show   4
   various angle on it.

4 (a) Explain the working of AJM with a diagram.   4
   (b) What are the advantages and disadvantages of ECM?   4
   (c) Explain EBM process and their applications.   4

5 (a) What is the purpose of using jig? Explain.   4
   (b) Explain the principle of designing the fixture.   4
   (c) Explain different types of clamps used in jig and fixture. 4

No of pages..........   Roll No--------

END SEMESTER SUPPLEMENTARY EXAMINATIONS FEBRUARY 2019
PE 201 (NEW SCHEME) ENGINEERING MATERIALS & MRTALLURGY
MAXIMUM MARKS : 40   TIME:3 hrs.

ANSWER ANY 5 QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS

1a. Discuss about plastic deformation in Poly crystalline materials. 04

1b. Discuss about Slip and Twinning with reference to the crystals. 04

2a. Discuss about the methods of preventing Corrosion. 04

2b. Write a brief note on properties, composition and application of any two types of Aluminium alloys. 04

3a. Write a brief note on strengthening mechanisms of metals. 04

3b. Explain the importance of Eutectic and Eutectoid points in a Binary phase diagram. 04

4a. Explain Creep fracture with a suitable diagram and suggest suitable materials against Creep fracture. 04

4b. Explain the mechanism of Brittle fracture and also discuss about Ductile to Brittle transition in metals. 04

5a. Explain about classification of Composite materials based on the type of Matrix used. 04

5b. Discuss about the applications of composite materials in industry. 04

6a. Explain about different compaction techniques used in making a component by using Powder metallurgy technique. 04

6b. Write a brief note on Surface treatment of Powder-Metallurgy components. 04

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B.Tech.[PE]

THIRD SEMESTER
SUPPLEMENTARY EXAMINATION

FEBRUARY-2019

PE-205 Manufacturing Machines

Time: 3:00 Hours

Max. Marks: 40

Note: Answer any FIVE questions.
Assume suitable missing data, if any.

1a. Evaluate the machining parameters for the case of cylindrical turning of a 25 mm diameter brass bar at a spindle speed of 900 rpm. Depth of cut is 3 mm and longitudinal feed rate is 0.2 mm per revolution. The length of work piece is 50 cm. Stock to be removed is 6 mm and side cutting edge angle of tool is 30°. Approach allowance= 3mm.   5

b. Sketch three views of a single point cutting tool and show its various angles.   3

2a. What is the main function of a lathe? State the different types of lathes.   4

b. Why mandrels are used on a lathe? Distinguish between driving plate and mandrel.   4

3. State with sketches and show the job-tool motion of the following drilling operations: 8
   (i) Counter boring
   (ii) Counter sinking
   (iii) Spot facing
   (iv) Undercutting

4a. Enumerate the machining parameters and related quantities in shaping.   4

b. Explain any two types of milling cutters.   4

5. Explain with sketches the following milling operations: 8
   (i) Slab milling
   (ii) Face milling
   (iii) Straddle milling
   (iv) T- slot milling

P.T.O

6a   Discuss how speeds, feeds and power requirements are choosen for a proposed machine tool.   5

b   Name the gear generating cutting processes. Explain the gear shaping process.   3

7a   What are the motions required for grinding a cylindrical workpiece?   4

b   Enumerate the machining parameters and related quantities in surface grinding.   4

-END-

SUPPLEMENTARY EXAMINATION   *February -2019*

PE-207   Engineering Analysis and Design

(Modeling and Simulation)

Time: 3:00 Hours   Max. Marks : 40

Note : Answer any five questions.
All questions carry equal marks.
Assume suitable missing data, if any.

Q.1. (a) Derive an expression for "Torsion"? Also write Assumptions? (4)

(b) A piston rod of steam engine 80cm long is subjected to a (4)
maximum load of 60 KN. Determine the diameter of the rod
using Rankine's formula with permissible compressive stress
of $100N/mm^2$. Take constant in Rankine formula as 1/7500
for hinged ends.

Q.2. (a) A hollow circular bar having outside diameter twice the (4)
inside diameter is used as a beam. From the bending moment
diagram of the beam, it is found that the bar is subjected to a
bending moment of 40kNm. If the allowable bending stress in
the beam is to be limited to $100MN/m^2$, find the inside
diameter of the bar.

(b) The principal stresses at a point across two perpendicular (4)
planes are 75 MN/m^2 (tensile) and 35 MN/m^2 (tensile). Find
the normal, tangential and resultant stress and its obliquity on
a plane at 20^0 with the major principal plane.

P·T·O

Q.3. (a) A ball of weight 120 N rests in a right angled groove. The (4)
sides of the groove are inclined to the angle of 30^0 and 60^0 to
the horizontal, if all the surfaces are smooth, then determine
the reactions at the points of contact?

(b) State and prove Lami's Theorem?

(c) State D'Alembert's principle giving equations expressing the (2)
principle for a rigid body in plane motion? (2)

Q.4. (a) What do you meant by Morphology in Design. Discuss its (8)
phases in detail.

Q.5. (a) Discuss types of mechanical failure found in components. (4)
write details of "corrosion failure".

(b) What role does computer play in product cycle. (4)

Q.6. (a) Define "Communication". How technical information is (4)
communicate in product cycle.

(b) Explain the term "Preliminary Need statement". Discuss
various factors considered during need analysis. (4)

END

THRID SEMESTER B. Tech. |ME|

END SEMESTER EXAMINATION Jan- 2019

PE-251 Engineering Materials and Metallurgy
(supplymentary)

Time: 3hr. Max. Marks: 40

> **Note:** All questions carry equal marks. Drawn neat diagram wherever necessary. Assume suitable missing data, if any.

Q1(a). Name the four components that are involved in the design, production, and utilization of materials, and briefly describe the interrelationships between these components. Draw (110) plane and derive planar density of its in terms of the atomic radius R.

Q1(b). Draw Iron-iron carbide equilibrium diagram and mark on it all salient temperatures and composition fields such as name the phase reactions occurring in Fe-Fe3C system and what are the temperatures and compositions at which they occur?

OR

Q1(b). Differentiate between Brittle fracture and ductile fracture with neat sketches.

Q2(a). Discuss in detail the heat treatment temperature, holding time, microstructural changes for annealing, normalising, hardening and tempering for a 0.2% carbon steel, 0.8% carbon steel, 1.2% carbon steel.

Q2(b). Define powder metallurgy technique used in the manufacturing of self-lubrication bearing. What are the limitations of powder metallurgy when compared to conventional casting techniques?

P.T.O.

Q3(a) Explain different type of copper alloys and cite the distinctive physical and mechanical characteristics and list at least two typical applications for each.

OR

Q3(a) Write a note on classification with composition and application of stainless steel.

Q3(b) write the assumption of CLT and derive the stress-strain relations for a classical laminate and represent the stress-strain variation in a laminated.

Q4(a). Define corrosion with a neat diagrams. What is galvanic corrosion? Pitting corrosion is more dangerous than uniform corrosion: why?

Q4(b). What is strengthening mechanism? Explain the strengthening mechanism of fiber-reinforcement used in composite materials.

Q5. Discuss any four:-
   (a)   Creep failure
   (b)   HSLA steels
   (c)   Interstitial Solid Solution
   (d)   Griffith theory
   (e)   Fatigue failure
   (f)   MMC

Total no of pages:02   Roll no................

B.Tech (AUTOMOBILE ENGG)-   III SEMESTER
FEB, 2019
                                                   SUPPLEMENTRY EXAMINATION

QUANTITATIVE TECHNIQUES (PE- 261)

MAX. MARKS: 50   Time : 3:00 hr

NOTE:

1. Answer any five questions.
2. Statistics tables are allowed.
3. Assume suitable missing data if any.

Q1. Solve the following Linear Programming problem by using Two-phase method.

Maximize $Z = x1 + 2x2 + 3x3 - x4$
subject to
$$x1 + 2x2 + 3x3 = 15,$$
$$2x1 + x2 + 5x3 = 20,$$
$$x1 + 2x2 + x3 + x4 = 10,$$
$$x1 \geq 0, x2 \geq 0, x3 \geq 0, x4 \geq 0$$ [10]

Q2. Solve the following game theory problem by using the principle of dominance:

Player B

		1	2	3	4	5	6
	1	4	2	0	2	1	1
	2	4	3	1	3	2	2
Player A	3	4	3	7	-5	1	2
	4	4	3	4	-1	2	2
	5	4	3	3	-2	2	2

[10]

Q3. Solve the following Integer Programming problem.

Maximize $Z = 4x_1 + 6x_2 + 2x_3$
subject to
$$4x_1 - 4x_2 \leq 5,$$
$$- x1 + 6x2 \leq 5,$$
$$- x1 + x2 + x_3 \leq 5,$$
$$x1 \geq 0, x2 \geq 0, x3 \geq 0 \text{ and } x1, x3 \text{ integer}$$ [10]

P.T.O

Q4. (a) Discuss the application and role of linear programming models in the field of automobile engineering. How you will utilize them in future? [5]

(b) Paras recorded the speeds of cars driving past his office, where the speed limit is 25 Km per hour. Assume that these speed recordings follow an approximately normal distribution. The mean of 90 readings was 23.84 Km per hour, with a standard deviation of 2.56 Km per hour.

(a)   What is the probability that a car goes with a speed of more than 25 Kph?
(b)   What is the probability that a car goes with a speed of 20 Kph or less? [5]

Q5. A researcher is interested in determining whether or not review sessions affect exam performance at a significance level of 0.05. The independent variable, a review session, is administered to a sample of students (n=9) in an attempt to determine if this has an effect on the dependent variable, exam performance. Based on information gathered in previous semesters, the population mean for a given exam is 24. The sample mean is 25, with a standard deviation (s) of 4. [10]

Q6. A manufacturer of sprinkler systems designed for fire protection claims that the average activating temperature is at least 135° F. To test this claim, you randomly select a sample of 32 systems and find the mean activation temperature to be 133° F with a standard deviation of 3.3°F. At $\alpha = 0.10$, do you have enough evidence to reject the manufacturer's claim? [10]

Q7. (a) Derive the formulae for the mean and standard deviation of Binomial distribution. Write all the notations and assumptions. [6]

(b) Write the short notes on any two of the following. [4]
    (i) Central Limit Theorem
    (ii) Dual simplex method
    (iv) Gomry's Constraint
    (v) ANOVA

-END-

END SEMESTER EXAMINATION (Supplementary)
FEB-2019

PE-353, Supply Chain Management (Open Elective)

Time: 1:30 Hours

Max. Marks : 50

Note : Answer any FIVE questions.
All questions carry equal marks.
Assume suitable missing data, if any.

1. (a) Explain the different sources and remedies of uncertainties in the supply chains.

(b) Explain the concept of centralized warehousing considering risk pooling.

(c) Differentiate the terms independent demand and dependent demand. How does the material requirement planning differ from economic order quantity?

[3+3+4]

2. (a) Discuss the various continuous review policies and its applications.

(b) Explain the phenomena of Bullwhip Effect. What are the causes of Bullwhip effect? Discuss the methods used to minimize the Bullwhip Effect.

(c) What are the factors considered for make or buy decisions? Discuss in detail.

[3+3+4]

3. (a) Discuss the application of information technology in a supply chain. How does it influence the supply chain performance?

(b) The University Gift Shop purchases sweatshirts emblazoned with the university name and logo from a vendor in Ahmedabad. The vendor

sells the sweatshirts to the Gift Shop for Rs. 350 apiece. Shipping from Ahmedabad to Delhi costs Rs. 11,000 per order. When an order arrives, it has been estimated that receiving and inspection tasks cost the Gift Shop Rs. 2,500. The annual holding cost for a sweatshirt is calculated as 10% of the purchase cost. The Gift Shop manager estimates that 3000 sweatshirts will be sold during the upcoming academic year.

(i) Determine the optimal order quantity using the basic EOQ model.

(ii) The vendor has recently offered a 3% discount on the purchase price if the Gift Shop orders 500 or more but less than 2000 at a time, and a 5% discount if the Shop orders 2000 or more at a time. Would you take up one of these offers? If so, what is the new optimal order quantity, and if not, why not? Use the same holding cost from part (i) throughout this question.

(iii) Based on your answer in part (ii), how many orders will there be in a year? What is the annual average inventory level?

(iv) Based on your answer in part (ii), what is the reorder point if the lead time is 3 business days? Assume that there are 260 business (working) days a year.

(v) In parts (i) and (ii), one type of the main inventory management costs has not been included in calculating the optimal order quantity. What is it and why? [2.5+7.5]

4. (a) What do you mean by arm's length relationship and strategic relationship of the supplier relationship management.

(b) Discuss the various forces behind the globalization of supply chain activities.

(c) Differentiate the terms Direct Shipment and Cross Docking. [3+3+4]

5. (a) Inventory control manager of a firm has collected the following data on one item
Minimum total cost per annum = Rs. 16000
Inventory holding cost per unit per year = Rs. 4
No of order per year = 10

Price per unit = Rs. 25
Calculate annual demand of the item, procurement cost per order, inventory carrying cost as a percentage of average inventory investment and economic order quantity (EOQ)

(b) In a firm, the demand for a certain item is random. It has been established that the monthly demand of an item has a normal distribution with a mean of 1000 and a standard deviation of 150 units. The unit price of an item is Rs 20/-. The ordering cost is Rs 40/-, the inventory carrying cost is estimated to be 15% per annum respectively. The procurement lead time is constant and is two months. Find the most economic ordering policy and the expected cost of controlling inventory given that the service level is 95%. [5+5]

5. Write short notes on the following [4×2.5=10]

(a) Third Party Logistics and its role in supply chains

(b) Material Requirement Planning

(c) Agile Manufacturing Systems

(d) Outsourcing

SUPPLEMENTARY EXAMINATION   *FEB-2019*

PE361 TOTAL QUALITY MANAGEMENT

Time: 3:00 Hours   *Max. Marks: 50*

Note: Answer **any** *FIVE* questions. Use of statistical tables is allowed. Assume suitable missing data, if any.

1. [a] What is quality cost? Explain different costs under quality cost.   (5)
    [b] How does a control chart help to control the quality of a product? Differentiate between chance causes and assignable causes of variation giving suitable examples.   (5)

2. [a] Explain Operating characteristic curve and the related terminology. (5)
    [b] Differentiate between variable and attribute type control charts. Explain the guidelines in implementing the control chart methodology. (5)

3. [a]. Explain Operating characteristic curve and the related terminology.
    (5)

    [b] A double sampling plan is as follows:
    i)   Select a sample of 2 from a lot of 20. If both articles inspected are good, accept the lot. If both are defective, reject the lot. If 1 is good and 1 defective, take a sample of one article.
    ii) If the article in the second sample is good, accept the lot. If it is defective reject the lot. If a lot 25% defective is submitted, what is the probability of acceptance?   (5)

4. [a] Discuss evolution of quality management systems. How ISO system is different from Six Sigma methodology.   (5)
   [b] Explain methodology of six sigma for service industry.   (5)

5. [a] The failure distribution of a component is defined by

$$f(t) = \frac{3t^2}{10^9}, \qquad 0 \le t \le 1000 \text{ hr}$$

Find the median life and the design life for a reliability of 0.98.   (5)

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[b]   A system is designed to operate for 110 days. The system consists of three components in series. Their failure distributions are:

(i) Weibull with shape parameter 1.3 and scale parameter 850 days;

(ii) lognormal with shape parameter (s) 0.7 and median 435 days;

(iii) constant failure rate of 0.0001. Compute the system reliability. (5)

6. [a] Write a short note on Bath tub curve.   (5)

   [b] Show that the low level redundancy has more reliability as compared high level redundancy.   (5)

7. Write short notes on **any two** of the following topics   (2X5)

   [a] Rectifying inspection

   [b] k-out-of-n redundancy

   [c] Minimum effort method for reliability allocation

   [d] Ishikawa diagram

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SUPPLEMENTARY EXAMINATION   *February-2019*

PE407 QUANTITATIVE TECHNIQUES

Time: 3:00 Hours   *Max. Marks: 40*

Note: Attempt any **five** questions. All questions **carry equal marks**. Assume suitable missing data, if any. **Use of statistical tables is allowed.**

1. **[a]** Define various measure of central tendency. List limitations of each measure in data analysis.

   [b] Differentiate between discrete and continuous random variables. Name two distributions from each category. State the assumptions for the Binomial distribution.

2. **[a]** A sample of 100 dry battery cells tested to find the length of life produced the following results:

   $\bar{x}=12$ hours, $\sigma=3$ hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life: i) More than 15 hours; (ii) Less than 6 hours, and (iii) between 10 and 14 years ?

(Given Z:	2.5	2	1	0.67
Area	0.4938	0.4772	0.3413	0.2487)

   [b] Suppose the probability that an item produced by a particular machine is defective, is 0.2. If 10 items produced by this machine are selected at random, what is the probability that not more than one defective item is found? Attempt this question by two approaches, i.e. binomial distribution approach and Poisson distribution approach.

3. **[a]** What do you mean by parameter estimation? Write different CI estimate expressions for single population mean and difference of two population means.

   P.T.O

[b] Explain the procedure for Hypothesis testing of population mean.

4. [a] Explain the sensitivity analysis for change in coefficients of objective function for basic and non-basic variables.

[b] Explain the sensitivity analysis for change in resource availability.

5. Discuss the branch and bound method for solving integer programming problems.

6. [a] Define the following terms in the context of game theory.
   i) Two person zero sum game
   ii) Saddle point

[b] Explain the dominance rules to solve a game theory problem.

7. Write short notes on any two of the following topics.
   [a] Special cases in LPP
   [b] Cutting plane algorithm
   [c] Dual-simplex method
   [d] Dispersion measures

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