

**FACULTY OF ENGINEERING**  
**B.E. (EEE) III – Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: Electrical Mechanics - I**

**Time: 3 Hours**

**Max. Marks: 70**

- Note:** (i) First question is compulsory and answer any four questions from the remaining six questions. Each Question carries 14 Marks.  
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.  
(iii) Missing data, if any, may be suitably assumed.

1.
  - (a) Define flux linkage.
  - (b) What are the requirements of Excitation system?
  - (c) Compare Lap and Wave windings.
  - (d) State the conditions under which a DC shunt generator fails to excite.
  - (e) What is the use of interpole in DC machine?
  - (f) Define all day efficiency of a transformer.
  - (g) List the applications of DC shunt and Series motors.
2.
  - (a) Obtain the relationship between Field energy and co-energy in a singly excited system.
  - (b) Explain the flow of energy in Electro mechanical devices.
3.
  - (a) Explain the armature reaction in DC generators and methods to minimize its effect.
  - (b) A 250, 14.9KW, 8-pole DC motor has single turn coils. The armature is wave wound with 94 commutator segments. If the brushes are shifted by 2 commutator segments at full load, Calculate (i) Total armature reaction ampere-turns (ii) De-magnetizing ampere-turns, (iii) Cross- magnetizing ampere-turns. Assume motor efficiency to be 80%.
4.
  - (a) Discuss the significance of back EMF in DC motors.
  - (b) Explain various speed control methods of DC motors.
5.
  - (a) Explain the OCC and external characteristics of various DC generators.
  - (b) Explain the Speed Torque characteristics of various DC Motors.
6.
  - (a) Explain the Hopkinson's test for obtaining the efficiency of two similar shunt motors and derive necessary equations.
  - (b) A 250 V DC shunt motor runs at 1000 rpm, while taking a current of 25. Calculate the speed for a line current of 50A if armature reaction weakens the field by 3%. Also, calculate the torque for the line current of 25A and 50A respectively. Given  $R_a = 0.2 \text{ ohm}$ ,  $R_f = 250 \text{ ohm}$  Voltage drop per brush is 1V.
7.
  - (a) Analyze the exact equivalent circuit of transformer and briefly discuss the various parameters involved in it.
  - (b) A 50 kVA, 4400/220 V transformer has  $R_1 = 3.45 \ \Omega$ ,  $R_2 = 0.009 \ \Omega$ . The values of reactances are  $X_1 = 5.2 \ \Omega$  and  $X_2 = 0.015 \ \Omega$ . Calculate (i) Equivalent resistance as referred to primary (ii) Equivalent resistance as referred to secondary (iii) Equivalent reactance as referred to both primary and secondary (iv) Equivalent impedance as referred to both primary and secondary (v) Total Cu loss, first using individual resistances of the two windings and secondly, using equivalent resistances as referred to each side.

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1.
  - (a) Explain about the energy bands in intrinsic and extrinsic Silicon
  - (b) Compare Half wave rectifier, Full wave rectifier and Bridge rectifier
  - (c) Define thermal runaway in transistor amplifier circuit
  - (d) Draw the equivalent h- model for CB Configuration
  - (e) An N-channel JFET has  $I_{DSS} = 10\text{mA}$  and  $V_P = -4\text{V}$ . Determine the minimum value of  $V_{DS}$  and Drain current  $I_D$ ?  $V_{GS} = -2\text{V}$  in pinch-off region
  - (f) Differentiate between exact and approximate model of a transistor at low frequencies
  - (g) Draw the Low frequency small signal model of CS, CD and CG amplifiers.
2.
  - (a) Draw the Energy band diagram of the PN junction diode and with the help of neat diagram explain its working under forward and reverse bias.
  - (b) Explain Zener diode as voltage regulator and its limitation.
3.
  - (a) Draw and explain the working of Full wave rectifier with L-section filter and derive its Ripple factor.
  - (b) Explain the construction and working of Solar cell. What are its merit's?
4.
  - (a) With the neat sketch explain input and output characteristics of CE configuration and derive its collector current equation.
  - (b) For the self bias circuit  $R_1 = 20\text{K}\Omega$ ,  $R_2 = 80\text{K}\Omega$ ,  $R_C = 2\text{K}\Omega$ ,  $R_E = 1\text{K}\Omega$  calculate Q point and Stability factor for  $\beta = 100$ .
5.
  - (a) Explain the High frequency -  $\Pi$  model of CE amplifier and derive  $A_i$ ,  $A_v$ ,  $R_i$  and  $R_o$ .
  - (b) For CE amplifier circuit  $V_{CC} = 20\text{V}$ ,  $R_S = 900\Omega$ ,  $R_1 = 60\text{K}\Omega$ ,  $R_2 = 3\text{K}\Omega$ ,  $R_C = 5\text{K}\Omega$ ,  $R_L = 1.1\text{K}\Omega$   $h_{ie} = 1\text{K}\Omega$ ,  $h_{re} = 2 \times 10^{-4}$ ,  $h_{fe} = 50$ ,  $h_{oe} = 25\mu\text{A/V}$  Compute  $A_i$ ,  $A_v$ ,  $R_i$  and  $R_o$  using approximate analysis.
6.
  - (a) Explain the construction and working of N- channel Enhance MOSFET with Drain and transfer characteristics.
  - (b) A JFET amplifier with voltage divider biasing circuit has the parameter  $V_P = 2\text{V}$ ,  $I_{DSS} = 4\text{mA}$ ,  $R_D = 900\Omega$ ,  $V_{DD} = 24\text{V}$ ,  $R_S = 2\text{K}\Omega$ ,  $R_2 = 8.57\text{m}\Omega$ . Find the value of drain current  $I_D$  at the operating point.
7.
  - (a) Explain the Bias Stabilizing techniques
  - (b) Why bridge rectifier is preferred over center tapped rectifier

**FACULTY OF ENGINEERING**

**B. E. (MECH/PROD) III – Semester (AICTE) (Main) Examination,  
March / April 2022**

**Subject: Metallurgy and Material Science**

**Time: 3 hours**

**Max. Marks: 70**

- Note:**
- i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 marks.**
  - ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.**
  - iii) Missing data, if any, may suitable be assumed.**

1.
  - a) State Hall-Petch Equation.
  - b) Define Strength, Hardness and Toughness.
  - c) Define Fracture.
  - d) Define Creep, Fatigue.
  - e) State the types of Binary phase diagrams.
  - f) State the purpose of Heat Treatment.
  - g) State the important properties of Ceramics.
2.
  - a) Explain in detail with neat diagrams about Crystal Defects.
  - b) What is CRSS, explain with neat diagram.
3.
  - a) Explain with neat diagrams about the modes of Fracture.
  - b) Explain in detail with neat diagram about Creep Curve.
4.
  - a) Explain in detail about Iron-Iron Carbide diagram.
  - b) What are the types of Cast Iron?
5.
  - a) Explain in detail about the various methods of Heat Treatment with diagrams.
  - b) State the composition and properties of HSS and Invar.
6.
  - a) State the types of Non Ferrous Metals and their applications.
  - b) Explain about the Classification of Composite materials.
7.
  - a) State the differences between creep curve and stress rupture curve.
  - b) State the applications of Composite materials.

**FACULTY OF ENGINEERING**

**B. E. (A.E) III – Semester (AICTE) Examination, March / April 2022**

**Subject: Fluid Mechanics and Machinery**

**Time: 3 hours**

**Max. Marks: 70**

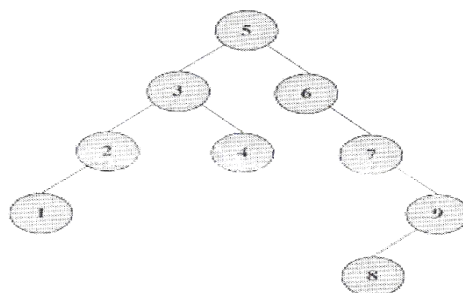
- Note:**
- i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 marks.**
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1

- (a) Explain Newton's law of viscosity and write the differences between Newtonian and Non-Newtonian fluids
  - (b) Define Dynamic viscosity and kinematic viscosity, and write their units
  - (c) Write the Bernoulli's equation and write the practical applications of Bernoulli's equation
  - (d) Explain Hydraulic gradient and total energy lines
  - (e) Write the differences between Impulse and Reaction turbines
  - (f) Explain the minimum speed for starting a Centrifugal pump
  - (g) Describe the functions of air vessels in a reciprocating pump.
- 2
- (a) The diameter of a water drop is 4 mm and if surface tension for water is 0.0736 N/m then find the pressure inside the drop.
  - (b) Explain briefly surface tension, capillary effect and compressibility
- 3
- (a) The following data refers to an orifice meter. Diameter of the pipe (D) is 300 mm, diameter of orifice (d) is 150 mm, reading of differential manometer is 500 mm of Hg. Specific gravity of oil flowing through the pipe is 0.9. Take coefficient of discharge of orifice meter as 0.64. Determine the discharge of the orifice meter.
  - (b) Compare and contrast the Orifice meter and Venturi meter
- 4
- (a) Describe various types of losses in pipes.
  - (b) Distinguish between laminar and turbulent flows.
- 5
- (a) Describe the Working of a Pelton wheel turbine
  - (b) Describe specific speed and explain its significance in selection of turbines
- 6
- (a) Explain the types of impellers, casings used in Centrifugal pumps.
  - (b) A single acting reciprocating pump has a bore of 200 mm and a stroke of 350 mm and runs at 45 rpm. The suction head is 8 m and the delivery head is 20 m. Determine the theoretical discharge of water and power required. If slip is 10%, what is the actual flow rate?
- 7
- (a) Describe the Indicator diagram of reciprocating pump
  - (b) Explain the flow through pipes in parallel and pipes in series and equivalent Pipe.

**FACULTY OF ENGINEERING****B.E. (CME/DS) III – Semester (AICTE) (Main) Examination, March / April 2022****Subject: Data Structures and Algorithms****Time: 3 Hours****Max. Marks: 70****Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Question carries 14 Marks.****(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.****(iii) Missing data, if any, may be suitably assumed.**

1.
  - (a) What is space complexity?
  - (b) Draw and represent a double Linked List.
  - (c) What is the advantage of circular queue over queue?
  - (d) Construct Binary Search Tree for the given numbers 56, 90, 78, 65, 34, 43, 56.
  - (e) What is Static Hashing?
  - (f) Differentiate max heap and min heap.
  - (g) Write ADT for Graph.
2. (a) Write about Asymptotic Notations in detail.  
(b) What is Sparse Matrix? Explain Sparse Matrix Addition in detail.
3. (a) Write ADT for Stack.  
(b) Write the Algorithm to convert an Infix expression to Postfix using stack. Demonstrate by converting given expression  $(X + Y - Z)/(W * V)$ .
4. (a) What is Linked Queue? Draw and represent with a neat diagram.  
(b) Explain all the operations on Linked Queue in detail.
5. (a) Write Inorder, Preorder and Postorder for the given tree.



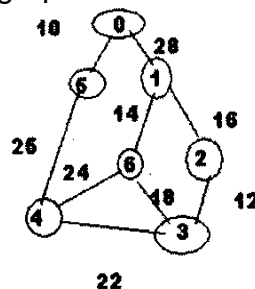
- (b) Construct AVL Tree for the twelve months of the year (Jan, Feb, March,...Dec).
6. (a) What is minimum cost spanning tree? Explain Kruskals Algorithm with an example.  
(b) Write the Algorithm to perform Quick Sort. Sort the given numbers using Quick Sort : 48,27,43,23,9,72,11.
7. (a) Write short notes on Polynomial representation and Sparse matrix representation.  
(b) Explain any two hash functions in detail.

**FACULTY OF ENGINEERING**

B.E. (AI&amp;DS) III - Semester (AICTE) (Main) Examination, March / April 2022

**Subject: Data Structure and Algorithms****Time: 3 Hours****Max. Marks: 70****Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Question carries 14 Marks.****(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.****(iii) Missing data, if any, may be suitably assumed.**

- 1
  - a) Define asymptotic notations.
  - b) What is an recursive algorithm?
  - c) What is circular queue?
  - d) Define a double linked list with an example.
  - e) Explain the concept of insertion of a node in singly link list.
  - f) Give the worst, best and average complexities for merge and quick sort.
  - g) Explain binary search algorithm.
  
- 2
  - a) Explain time complexity of an algorithm? Explain different types of notations used for time complexity.
  - b) Write about threaded Binary Tree.
  
- 3
  - a) Explain stack using arrays with the help of an C program.
  - b) List out different applications of stacks.
  
- 4
  - a) What is binary search tree? Explain searching, insertion and deletion operations on binary search tree.
  - b) What are the differences between Trees & Graphs?
  
- 5 What is minimum cost spanning tree? Use Kruskal's algorithm to find minimum cost spanning tree for the following graph.



- 6
  - a) Explain the BFS and DFS traversals of a graph with an example.
  - b) Explain the concept of circular linked list with the help of an program.
  
- 7 Write short notes on the following:
  - a) AVL Trees Insertion & deletion
  - b) Heap sort
  - c) Linked representation of stack and queues.

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**FACULTY OF ENGINEERING**

**B.E. (AI&ML) III - Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: Data Structure & Algorithms**

**Time: 3 Hours**

**Max. Marks: 70**

**Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 marks.**

**(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.**

**(iii) Missing data, if any, may be suitably assumed.**

- 1 (a) What is a Static & Dynamic representation of Data Structure?  
(b) What is a Threaded Binary Tree?  
(c) Write the examples of Infix, Prefix & Postfix expressions.  
(d) Write the definition of the B-Trees.  
(e) Difference between the directed & undirected graph.  
(f) What are Collision's?  
(g) What is a Quadratic Probing?
- 2 (a) Explain in detail about the stack and its operations.  
(b) Write about the Circular Queue.
- 3 (a) Explain about the Doubly Linked List. How elements are inserted and deleted in doubly linked list?  
(b) What are the advantages and disadvantages of the linked lists?
- 4 (a) How to create and represent the Binary Search Tree?  
(b) Write about the Red-Black Trees.
- 5 (a) Explain about the Depth First Search Algorithm. Using an appropriate example.  
(b) Write about the Minimum Spanning Trees.
- 6 (a) Write about the Separate Chaining.  
(b) Write about the Open Addressing-Linear probing.
- 7 (a) Explain in detail about the Prim's Algorithm. Using an example.  
(b) Write about the Multi-way Trees.

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**FACULTY OF ENGINEERING**

**B.E. (IoT) III - Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: Data Structure Using Python**

**Time: 3 Hours**

**Max. Marks: 70**

- Note:** (i) First question is compulsory and answer any four questions from the remaining six questions. Each Question carries 14 Marks.  
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.  
(iii) Missing data, if any, may be suitably assumed.

1.
  - (a) List the features of Python?
  - (b) Explain the Queue ADT?
  - (c) Design the Linked representation of a Stack?
  - (d) Differentiate between the Binary Tree and Threaded Binary Tree?
  - (e) Explain Quick sort technique?
  - (f) Discuss about the Hashing Graph?
  - (g) List the operators in Python?
2. (a) Why do we need data structures and List some common data structures with the examples?  
(b) Mention the benefits of using Python?
3. (a) Mention the features of ADT?  
(b) Differentiate the Linear Queue and Circular Queue?
4. (a) What are the ways of implementing linked list?  
(b) When double linked list can be represented as circular linked list and explain with an example?
5. (a) Explain AVL tree ADT in detail?  
(b) Explain threaded binary tree ADT in detail?
6. (a) Explain the various sorting algorithms?  
(b) Compare all the searching and sorting methods?
7. (a) Write a python program to implement all the operations in a stack?  
(b) Compare linear and non-linear data structures and their representations in the memory using array and linked list?



## FACULTY OF ENGINEERING

B.E. (IT) III - Semester (AICTE) (Main) Examination, March / April 2022

Subject: Data Structures

Time: 3 Hours

Max. Marks: 70

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Question carries 14 Marks.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper

(iii) Missing data, if any, may be suitably assumed.

1.

- Define Circular queues? Give an example.
- When is an undirected graph said to be 'connected'?
- Define time complexity and space complexity of an algorithm.
- Define Abstract Data Type (ADT) and give an example.
- Define a sparse matrix and give an example.
- What is Encapsulation?
- Define AVL Tree.

- Explain in detail about the Sub typing and Inheritance in C++.
  - Discuss in detail about Representing Chains in C++ and Template Class chain.

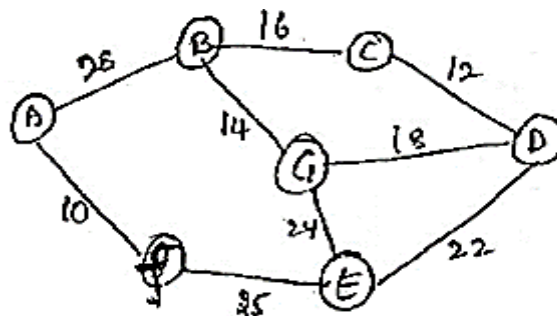
- What is hashing? Explain the process of overflow handling in hashing.
  - Define maxheap and minheap. Give examples.

- Make a Binary Search Tree(BST) for the following sequence of numbers: {100, 50, 200, 300, 20, 150, 70, 180, 120, 30}. Traverse the obtained BST in Preorder, Postorder, and Inorder.
  - Explain the operations on an AVL Tree.

5. Write procedure for insertion and deletion of an element from a doubly linked list.

- Write a C++ function to perform Insertion Sort. Trace the algorithm for the elements. {12, 2, 16, 30, 8, 28, 4}
  - How is shell sort different from insertion sort?

- Use Kruskal's algorithm to find minimum cost spanning tree for the following graph.



- Discuss about the graph traversals methods.

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**FACULTY OF ENGINEERING**  
**B.E. (ECE/M/P/AE) III Semester (AICTE) (Main & Backlog) Examination,**  
**March / April 2022**

**Subject: Mathematics - III**

**Time: 3 Hours**

**Max. Marks: 70**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Eliminate the arbitrary function  $f$  from  $z = f\left(\frac{y}{x}\right)$  to obtain a partial differential equation.
2. Solve  $p\sqrt{x} + q\sqrt{y} = \sqrt{z}$ .
3. Solve  $\frac{\partial z}{\partial x} = \frac{\partial z}{\partial y}$  by the method of separation of variables.
4. Classify the partial differential equation  $\frac{\partial^2 u}{\partial x^2} + 2\frac{\partial^2 u}{\partial x \partial y} + 4\frac{\partial^2 u}{\partial y^2} = 0$ .
5. If a random variable has a Poisson distribution such that  $P(1) = P(2)$ , find mean of the distribution.
6. Write any two properties of the normal distribution.
7. Show that the correlation coefficient is the geometric mean of the regression coefficients.
8. Write the normal equations corresponding to fit the straight line  $y = a + bx$  by the method of least squares.
9. Write any two uses of F-test.
10. Write the test statistic  $t$  to test of significance for single mean of small sample.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. Solve  $(p^2 + q^2)y = qz$  by Charpit's method.
12. Solve the Heat equation  $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$  subject to the conditions  
 $u(0, t) = u(l, t) = 0$  and  $u(x, 0) = x$ .
13. (a) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2,000 individuals more than two will get a bad reaction.  
 (b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
14. (a) Find the line of regression of Y on X for the following data.
 

X	10	12	13	12	16	15
Y	40	38	43	45	37	43

 (b) A die was thrown 9000 times and a throw of 5 or 6 was obtained 3240 times. On the assumption of random throwing, do the data indicate an unbiased die?

15. (a) Two independent sample of sizes 7 and 6 had the following values:

Sample A	28	30	32	33	31	29	34
Sample B	29	30	30	24	27	28	

Examine whether the samples have been drawn from normal populations having the same variances.

(b) Fit a Poisson distribution to the following data and best the goodness of fit:

$x$	0	1	2	3	4
$f$	109	65	22	3	1

16. (a) Form the partial differential equation by eliminating the arbitrary function  $f$  from  $f(x^2 + y^2, z - xy) = 0$ .

(b) Define uniform distribution and hence find its variance.

17. (a) Find the coefficient of correlation for the following data.

$x$	10	12	18	24	23	27
$y$	13	18	12	25	30	10

(b) Two samples of sodium vapour bulbs were tested for length of life and the following results were got:

	Size	Sample mean	Sample S.D
Type I	8	1234 hrs	36 hrs
Type II	7	1036 hrs	40 hrs

Is the difference in the means significant to generalize that Type I is superior to Type II regarding length of life?

**FACULTY OF ENGINEERING**

**B.E. (Civil) III - Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: Fluid Mechanics**

**Time: 3 Hours**

**Max. Marks: 70**

- Note:** (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.  
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.  
(iii) Missing data, if any, may be suitably assumed

- 1 (a) Write down dimensional formula for Kinematic Viscosity.  
(b) Differentiate between Simple and differential Manometers.  
(c) Explain the terms 'Path line' and 'Stream line'.  
(d) Define the terms 'Stream function' and 'velocity potential'.  
(e) What do you understand by the terms 'Total acceleration' and 'Convective acceleration'?  
(f) Mention merits and demerits of Venturimeter with respect to Orifice meter.  
(g) What do you understand by stagnation Pressure?
- 2 (a) List properties of fluids and explain surface tension with a neat sketch.  
(b) A glass tube 0.25 mm contains a mercury column with water above the mercury. The temperature is 20° C at which the surface tension of mercury in contrast with water is 0.037 kg(f)/m. What will be the capillary depression of the mercury? Take angle of contact=130°
- 3 (a) State and prove Pascal's Law with neat sketch.  
(b) What are the gauge pressure and absolute pressure at a point 3m below the free surface of a liquid having a density of  $1.53 \times 10^3 \text{ kg/m}^3$  if the atmospheric pressure is equivalent to 750 mm of mercury? The specific gravity of mercury is 13.6 and density of water=1000 kg/m<sup>3</sup>
- 4 (a) Explain in details the classification of fluid flows.  
(b) The velocity components in a two dimensional incompressible flow are  
 $u=y^3 + 6x - 3x^2y$  and  $v=3y^2x - 6y - x^3$   
(i) Is the flow continuous?  
(ii) Is the flow irrotational?
- 5 (a) Derive Euler's equation of motion in one Dimensional flow.  
(b) A pipe through which water is flowing, is having diameters 20 cm and 10 cm at the cross-sections 1 and 2 respectively. The velocity of water at section 1 is given 4 m/s. Find the velocity head at sections 1 and 2 and also discharge.

- 6 (a) Derive an expression for the rate of flow through a rectangular notch.  
(b) A Venturimeter having a diameter of 75 mm at the throat and 150 mm diameter at the enlarged end is installed in a horizontal pipeline 150 mm in diameter carrying an oil of specific gravity 0.9. The difference of pressure head between the enlarged end and the throat recorded by U-tube is 175 mm of mercury. Determine the discharge through the pipe. Assume the coefficient of discharge of the meter as 0.97
- 7 (a) What is the relation between pressure and density of a compressible fluid for (i) isothermal process and (ii) adiabatic process.  
(b) State Bernoulli's theorem for compressible flow. Derive an expression for Bernoulli's equation when the process is adiabatic.

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**FACULTY OF ENGINEERING**  
**B.E. (CE/EEE/EIE/CSE/CME) III – Semester (AICTE) (Main & Backlog)**  
**Examination, March / April 2022**  
**SUBJECT: Biology for Engineers**

**Time: 3 Hours**

**Max marks: 70**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. State the types of cells?
2. Outline the functions of enzymes?
3. Write a note on excretion?
4. Write short notes on microbes?
5. Write a brief account on variation?
6. State the function of nucleic acids?
7. What is cancer?
8. How can we control AIDS?
9. Write about bioremediation?
10. State one use of biofilters?

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. (a) Describe in detail the structure of eukaryotic cell?  
(b) Explain different methods of controlling microbial growth physical and chemical methods?
12. (a) Explain about photosynthesis and its significance in plants?  
(b) Explain the functions of circulatory system describing the structure of the heart?
13. (a) Explain the significance of the central dogma of life?  
(b) Discuss theories of evolution?
14. (a) Discuss the causes, diagnosis, and treatment of hepatitis.  
(b) Explain the pros and cons of effective immunization?
15. (a) Discuss the production of bioenergy.  
(b) Elucidate the exclusive role of biopolymers in bioengineering?
16. (a) Give a detailed account on history of microbes?  
(b) Elucidate the importance of nitrogen fixation in plants.
17. (a) Discuss the merits and demerits of genetic engineering?  
(b) Explain the process of drug discovery and its applications.

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**FACULTY OF ENGINEERING**

**BE (EIE) III - Semester (AICTE) (Main) Examination, March / April 2022**

**SUBJECT: Transducer Engineering**

**Time: 3 Hours**

**Max. Marks: 70**

**Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.**

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**(iii) Missing data, if any, may be suitably assumed**

1.
  - a) Differentiate between Repeatability and reproducibility.
  - b) List out the basic requirements of transducer.
  - c) What is RVDT? Explain?
  - d) What are the standards adopted for calibration of temperature?
  - e) Mention the various pressure transducers with their advantages and disadvantages?
  - f) State the principle of operation of Bellows.
  - g) What do you mean by pyrometers?
2.
  - a) Explain with a neat diagram, the measurement system?
  - b) Derive the equation for Unit, Ramp and Sinusoidal inputs response of a first order system.
3.
  - a) Classify various types of transducer with proper examples?
  - b) What do you mean by Strain gauge, explain any two methods in detail with relevant figures?
4.
  - a) What is proximity? Explain the capacitive proximity transducer in detail with relevant diagrams?
  - b) Explain the operating principle of LVDT?
5.
  - a) List out the various effects employed for measurement purpose.
  - b) Explain in detail any one type of temperature measuring devices in detail?
6.
  - a) What do you mean by transduction method, explain?
  - b) Derive the expression for the deflection of diaphragm of a pressure measurement type of transducer.
7.
  - a) Explain in detail the Static and Dynamic response of measurement system?
  - b) With a neat sketch, explain the Potentio-metric type for measurement of pressure?

**FACULTY OF ENGINEERING**  
**BE (CSE) III – Semester (AICTE) (Main) Examination,**  
**March / April 2022**

**Subject: Data Structures and Algorithms**

**Time: 3 Hours**

**Max marks: 70**

**Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each Questions carries 14 Marks.**

**(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.**

**(iii) Missing data, if any, may be suitably assumed.**

- 1 (a) Explain Performance Analysis of an Algorithm.  
(b) How can a polynomial such as  $6x^6+3x^5+9x^4+2x^2+x-19$  be represented by a linked list?  
(c) Give the conditions for identifying a circular queue to be full and empty, when implemented using an array.  
(d) Write AVL tree rotations.  
(e) Calculate the time complexity of Quick Sort Algorithm  
(f) Justify the data structure used for computing the DFS graph.  
(g) Convert the given infix expression into postfix notation:  $9+1-3/(4-1)*5$
- 2 (a) Explain String ADT and implement String ADT using C program.  
(b) Write various representations of sparse matrix. Explain with an example.
- 3 Write a program to convert infix expression into postfix expression.
- 4 (a) Write a program for the following operations using linked list.  
(i) Insert at last node (ii) Delete the first node (iii) Search for an element  
(iv) Display the elements  
(b) Define collision? Summarize different collision resolution techniques with examples?
- 5 (a) Define Heap. Construct and explain a heap with suitable example.  
(b) Construct a Binary Search Tree for the following data and perform in-order, Preorder and Post-order traversal of the tree. 50, 60, 25, 40, 30, 70, 35, 10, 55, 65, 5.
- 6 (a) Develop an algorithm for Breadth First Search Traversal of a graph and discuss with an example.  
(b) Write a program for binary search of a element.
- 7 (a) Show how Quick sort algorithm works on the input: 5, 9, 1, 7, 3, 8, 6, 2, 4  
(b) Explain prim's algorithm to find minimum spanning tree.

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**FACULTY OF ENGINEERING**  
**BE III Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Engineering Mathematics - III (Except I.T)**

**Time: 3 Hours**

**Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Show that  $f(z) = \sin z$  is analytic in the finite  $z$  – plane.
2. Write Cauchy- Riemann equations in polar form.
3. Find the nature and location of the singularity of the function  $f(z) = \frac{z - \sin z}{z^2}$ .
4. Expand  $f(z) = \cos z$  about  $z = 0$  in Taylor's series.
5. Express  $f(x) = x$  as half- range cosine series in  $0 < x < 2$ .
6. Write Fourier series expansion of odd periodic function  $f(x)$  in  $(-c, c)$ .
7. Form partial differential equation by eliminating the arbitrary functions  $f$  and  $g$  from  $z = f(x + iy) + g(x - iy)$ .
8. Solve  $z = px + qy + \sqrt{1 + p^2 + q^2}$ .
9. Classify the partial differential equation  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$ .
10. Solve  $4 \frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0$  using the separation of variables.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. a) Evaluate  $\oint \frac{e^{2z}}{(z+i)^4} dz$ ,  $C: |z| = 3$ , using Cauchy's integral formula.  
 b) Show that  $f(z) = |z|^2$  is not analytic at any point.
12. a) Evaluate  $\oint \frac{ze^z}{(z^2+9)} dz$ , where  $c$  is  $|z| = 5$ .  
 b) Find the bilinear transformation which maps the points  $(1, i, -1)$  of  $z$  – plane to  $(i, 0, -i)$  of  $w$  – plane.
13. Find the half range cosine and sine series for the function  $f(x) = x^2$  in  $[0, \pi]$ .  
 Hence find  
 the sum of the series  $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2}$ .
14. a) Find the general solution of the partial differential equation  
 $(mz - ny) \frac{\partial z}{\partial x} + (nx - lz) \frac{\partial z}{\partial y} = ly - mx$   
 b) Solve  $(D^2 - DD')z = \cos x \cos 2y$ .
15. An elastic string of length  $l$  which is fastened at its end  $x = 0$  and  $x = l$  is released from its horizontal position (zero initial displacement) with initial velocity  $\lambda x(l - x)$ . Find the displacement of the string at any instant time.

..2..

16. a) Evaluate  $\int (z^2 + 3z)dz$  along the straight line from (2,0) to (2,2) and then (2,2) to (0,2).

b) Solve  $(x + y)(p + q)^2 + (x - y)(p - q)^2 = 1$ .

17. a) Evaluate  $\int_0^{2\pi} \frac{\cos 2\theta}{5 + 4\cos\theta} d\theta$ , using Residue theorem.

b) By using half range sine series for  $f(x) = 1$  in  $0 < x < \pi$ , show that  $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2}$ .

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**FACULTY OF ENGINEERING**

**B.E. (I.T) III - Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Microelectronics**

**Time: 3 Hours**

**Max. Marks: 70**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Differentiate Zener and Avalanche breakdown mechanisms.
2. Obtain the efficiency of a Full- wave rectifier.
3. Draw the symbols of N channel & P channel FETs
4. Compare BJT and FET.
5. State the Barkhausen condition of Oscillation.
6. Discuss the advantages of negative feedback.
7. Implement Op-amp as a Differentiator.
8. Define CMRR of an OP-Amp.
9. Define a) Delay Power product & b) Fan out.
10. State the advantages of CMOS logic

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. a) Explain the operation of a Half-wave rectifier with a neat sketch.  
b) Discuss about Positive, Negative & Double clippers.
12. a) Discuss the operation of a BJT as a Switch.  
b) Describe the structure & operation of a p channel JFET.
13. a) Explain the operation of Hartely oscillator with the help of a neat circuit diagram.  
b) Sketch the series – Series & Shunt – Series feedback topologies.
14. a) Discuss the characteristics of an Ideal Op-Amp.  
b) Derive the gain of an OP-amp Non-Inverting amplifier.
15. a) Implement AND and Ex-OR gates using CMOS logic.  
b) Sketch the VTC of a CMOS Inverter & explain.
16. Explain the operation of a Monostable multi-vibrator.
17. Write notes on the following
  - a) Transistor as an amplifier.
  - b) Schottky diode.

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**FACULTY OF ENGINEERING**  
**B.E. II / IV (CIVIL) I - Semester (NON-CBCS) (Backlog) Examination,**  
**March / April 2022**

**Subject: Engineering Geology**

**Time: 3 Hours**

**Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer all questions.**

**(25 Marks)**

- 1 Describe the importance of geology in Civil Engineering.
- 2 List out common geological structures. Discuss them in brief.
- 3 State characteristics of Igneous rocks.
- 4 Identify the elements at risk with respect to landslides.
- 5 Differentiate between fluvial and aeoline landforms.
- 6 Describe briefly the layers of interior of earth.
- 7 Define the terms un-confined aquifer and confined aquifer with neat sketches.
- 8 What is rock weathering?
- 9 Differentiate between texture and structure of the rock.
- 10 Describe causes of folding.

**PART – B**

**Note: answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 (a) How is geology related to engineering? Discuss the importance of geology in the field of Civil Engineering.  
(b) How do sedimentary rocks differ from metamorphic rocks?
- 12 (a) With a neat diagram, describe different parts of a fault.  
(b) What are the three important clay minerals and write a note on their engineering properties?
- 13 (a) Describe the uses and limitations of Aerial photographs.  
(b) Compared to Himalayan region earthquakes are less frequent in Hyderabad-elucidate.
- 14 (a) What are the geological considerations in the selection of concrete aggregate, highway and runway aggregate, building stones,HN decorative stones?  
(b) Describe geological factors considered in the construction of tunnels. Add a note on overbreak in tunnel.
- 15 (a) Define seismic waves and mention the different properties of seismic waves.  
(b) Give physical properties of Mica.
- 16 (a) Explain the application of remote sensing and GIS technique in civil engineering.  
(b) How do the trends of geological structures decide the location of huge civilian constructions like dam and reservoirs?
- 17 Write notes on any two of the following:
  - (a) Types of Indian soils
  - (b) Engineering classification of rock weathering
  - (c) Mohr's scale of hardness.

## FACULTY OF ENGINEERING

**B.E. II / IV (EEE/EIE) I - Semester (NON-CBCS) (Backlog) Examination,  
March / April 2022**

**Subject: Electrical Measurements and Instrumentation**

**Time: 3 Hours**

**Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

### PART – A

**Note: Answer all questions.**

**(25 Marks)**

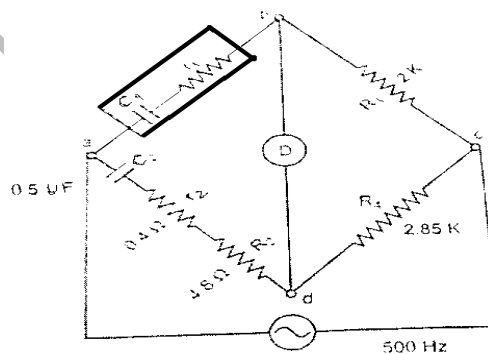
1. Define precision and uncertainty
2. What is recording type of instruments?
3. What is creeping and how it can be reduced?
4. What are the errors in energy meters?
5. What is Megger?
6. Draw Kelvin Double Bridge
7. What is current Transformers?
8. What is phase angle error?
9. What is mean by standardization of DC potentiometer?
10. Draw the diagram of calibration of Ammeter.

### PART – B

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. Explain in detail about standard cell and standard resistance.
12. Explain in detail construction and working of single phase energy meter.
13. For the given bridge find the value of  $r_1$ ,  $C_1$  and also find dissipation factor of  $C_1$ , Deduce the expression used.



14. Explain in detail about strain gauge and Hall effect transducers.
15. With the help of neat diagram explain the working of Crompton's DC potentiometer and write its applications.
16.
  - a. Derive torque expression for dynamometer instruments.
  - b. Explain in detail about the method for Reactive power measurement.
17. What is meant by ratio and phase angle error of a transformer? Derive the necessary expressions for these errors.

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**FACULTY OF ENGINEERING**  
**B.E II / IV (ECE) I-Semester (Non-CBCS) (Backlog) Examination,**  
**March / April 2022**  
**Subject: Electronic Devices**

**Time: 3 Hours**

**Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer all questions.**

**(25 Marks)**

1. What is the effect of temperature on diode characteristics? Give the units of mobility.
2. The reverse saturation current of Silicon PN Junction diode is  $15\mu\text{A}$ . Calculate the diode current for the forward bias voltage of  $0.6\text{ V}$  at  $25^\circ\text{C}$ .
3. Why is bleeder resistance employed in filter circuits?
4. A half wave rectifier has  $25\text{V}$  rms sinusoidal AC input and  $600\Omega$  load resistance. Calculate the  $V_{\text{DC}}$ ,  $I_{\text{DC}}$  &  $\text{PIV}$ .
5. Define emitter efficiency ( $\gamma$ ), transport factor ( $\beta$ ) and large signal current gain ( $\alpha$ ) of a transistor.
6. Briefly explain how a transistor acts as an amplifier.
7. Differentiate between SCR and TRIAC.
8. Draw the Equivalent h-parameter model of a transistor in CE Configuration. Define all the h-parameters.
9. Explain the field effect phenomena of JFET.
10. Define pinch off voltage  $V_p$ . Sketch the depletion region before and after pinch-off.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. a) What is PN-Junction Diode? Explain its working under forward and Reverse Bias with neat diagram.  
b) Explain how zener diode works as a regulator.
12. a) Derive all performance parameters of a Bridge rectifier Circuit.  
b) Design Full wave rectifier circuit with LC Filter to provide an output voltage of  $10\text{V}$  with a load current of  $200\text{m A}$  and ripple is limited to  $2\%$ .
13. a) Derive the stability factor equation of a collector to base bias circuit.  
b) Distinguish between AC and DC load lines with suitable examples.
14. A Common emitter amplifier has  $R_S$  and  $R_L$ . Find the input impedance, current gain, voltage gain, and Output Impedance. Use Exact Analysis for Hybrid model.
15. a) Explain the construction and working of a TRIAC. Sketch its V-I Characteristics.  
b) Draw and explain UJT voltage current characteristics.
16. a) Explain the Basic operation and characteristics of depletion and enhancement type MOSFET.  
b) An N-channel JFET has  $I_{\text{DSS}}=10\text{m A}$ ,  $V_p=-4\text{V}$ . Determine the minimum value of  $V_{\text{ps}}$  for pinch off region and drain current  $I_D$ .  $V_{\text{GS}}=-2\text{V}$  in pinch off region.
17. Write short notes on
  - a) Base width Modulation
  - b) LCD
  - c) Compensation Techniques.

**FACULTY OF ENGINEERING**

**B.E. II / IV (MECH/PROD) I - Semester (Non-CBCS) (Backlog) Examination,  
March / April 2022**

**Subject: Machine Drawing**

**Time: 3 Hours**

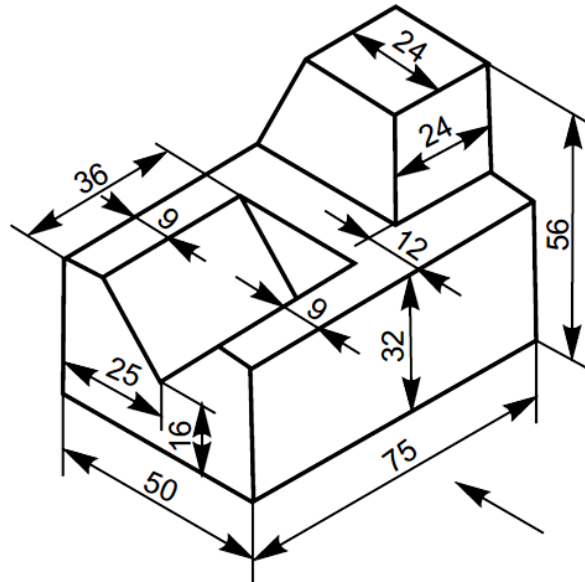
**Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

**Note: Answer all questions from PART-A & PART-B.**

**PART – A (25 Marks)**

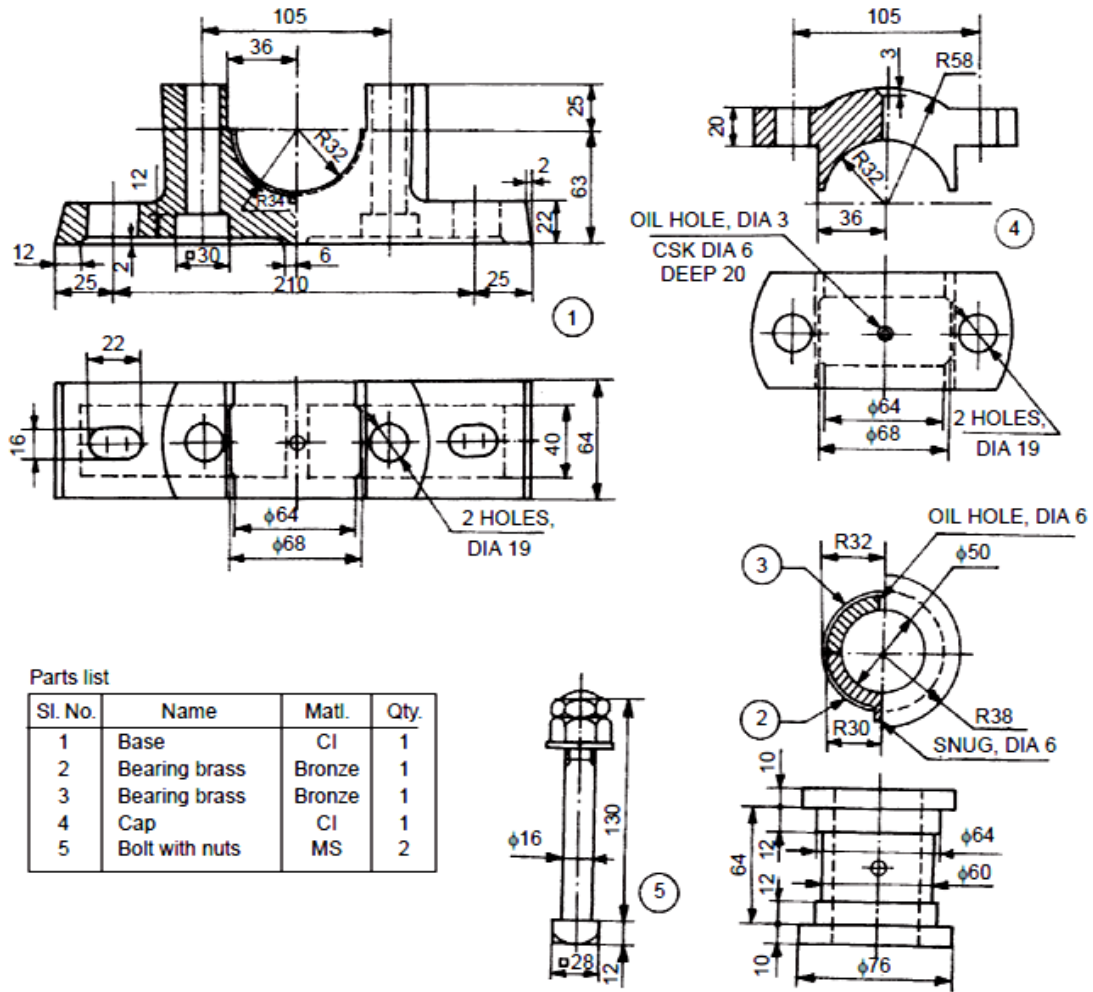
1. Sketch the conventional representation of the following:  
a) Steel b) Concrete and c) Glass.
2. Draw the front and top view of the below given component



3. Draw the sectional front view and top view of the single riveted lap joint. Take plate thickness,  $t=10$  mm.
4. Sketch the standard two views of a Hexagonal headed bolt with proportions marked.
5. Draw the two views of Half-lap muff coupling; take  $D=30$  mm.

**PART – B ( 50 Marks)**

6. Assemble all the parts of the Plummer block bearing shown in figure below and draw  
a) Full sectional front view and b) Top view



Parts list

Sl. No.	Name	Matl.	Qty.
1	Base	CI	1
2	Bearing brass	Bronze	1
3	Bearing brass	Bronze	1
4	Cap	CI	1
5	Bolt with nuts	MS	2

Fig. Plummer block

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**FACULTY OF ENGINEERING**  
B.E. II / IV (CSE) I – Semester (NON-CBCS) (Backlog) Examination,  
March / April 2022

**Subject: Computer Architecture**

**Time: 3 Hours**

**Max. Marks: 75**

**(Missing data, if any, may be suitably assumed)**

**PART – A**

**Note: Answer all questions.**

**(25 Marks)**

- 1 What is RTL?
- 2 List out memory reference instructions?
- 3 What is interrupt? List out various types?
- 4 Give example for reverse polish notation?
- 5 What is memory interleaving?
- 6 What is the use of array multiplier?
- 7 What is the purpose of strobe control?
- 8 Distinguish between serial and parallel data transfer?
- 9 Define page replacement technique and enlist types of page replacement techniques.
- 10 Draw the block diagram of RAM chip with its functions?

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 a) Explain instruction cycle with example flow chart?  
b) How register reference and memory reference instructions are different?
- 12 a) Briefly explain arithmetic and Logical instructions with an example?  
b) Write a short note on status bit conditions?
- 13 a) What is pipelining? Explain with an example?  
b) Explain BCD adder with neat sketch?
- 14 a) Differentiate memory mapped and programmed I/O?  
b) Construct asynchronous data transfer?
- 15 a) Discuss memory mapping techniques.  
b) Write short notes on memory hierarchy with a neat sketch?
- 16 a) Explain in detail about basic computer organization.  
b) Describe RAM and ROM chips.
- 17 Write a short notes on:
  - a) Floating point arithmetic
  - b) Priority interrupts

**FACULTY OF ENGINEERING**  
**B.E. II / IV (IT) I - Semester (NON-CBCS) (Backlog) Examination,**  
**March / April 2022**

**Subject: Electrical Circuits and Machines**

**Time: 3 Hours**

**Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

**PART – A**

**Note: Answer all questions.**

**(25 Marks)**

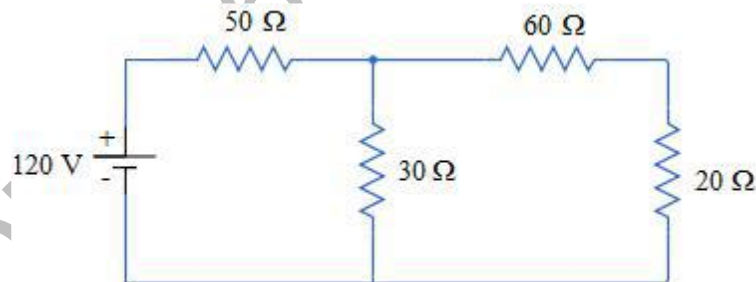
1. Derive the expression for energy stored in an inductor.
2. Define Average value, R.M.S value of Alternating voltage.
3. What is relation between line voltage and phase voltage in star and delta connected system.
4. What are various losses in transformer?
5. What is armature reaction in DC machine?
6. What is back EMF and its significance?
7. A 50Hz, 4-pole 3 phase induction motor has a rotor current of frequency 2Hz. Determine the speed of motor.
8. Compare squirrel cage and slip ring and three phase induction motor.
9. Mention various types of single phase induction motors.
10. List the application of BLDC motor.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 a) Calculate current in  $20\Omega$  resistor by using Thevenin's theorem for the circuit shown below



- b) Find the RMS value of  $v(t) = 10 \sin(t)$ .
12. a) State and explain Nortons theorem.  
 b) In a 100 KVA transformer the iron loss is 1200 KW & full load copper loss is 2.200 KW. If the load power factor is 0.8 lagging, find the efficiency at (i) Full load, (ii) half full load.
13. Explain two – watt meter method of 3 phase power measurement.
- 14.a) Explain various speed control method of dc shunt motor.  
 b) 4- pole motor is fed at 440V and takes an armature current of 50A. The resistance of the armature circuit is  $0.28\Omega$ . The armature winding is wave connected with 888 conductors and useful flux per pole is  $0.023\text{Wb}$ . Calculate the speed of motor.

-2-

15. a) Derive emf Equation of DC machine.  
b) Explain the working of 3-point starter with a neat diagram.
  
16. Explain the following motors with neat schematic diagrams.
  - a) Stepper motor
  - b) Capacitor start motor
  
17. Write notes on the following.
  - a) Mutual inductance
  - b) Auto transformer

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