

FACULTY OF ENGINEERING

BE III – Semester (AICTE) (CE/EE/EIE/M/P/AE) (Backlog) Examination,

November 2021

Subject: Engineering Mechanics

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

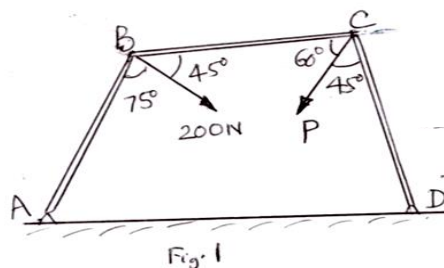
1. What are the characteristics of a force?
2. Enumerate the different system of forces
3. State pappus theorems.
4. What is the moment of inertia and radius of gyration of a solid circular section of diameter 'd' about its diametrical axis.
5. Explain different types of friction in brief.
6. For a perfect frame having 13 members, find the number of joints, use the formula.
7. A particle moves along a straight line. Its motion is represented by the equation $S = 16t + 4t^2 - 3t^3$, Where, S is meters and "t" in seconds. Determine displacement, velocity and acceleration 2 sec after start.
8. A stone is thrown vertically upwards and returns to earth in 3 sec. How high does it go?
9. A body wt 1000N moves on a level horizontal road for a distance of 400 m. The resistance of the road is 10 m per 1000N wt of the body. Find the work done on the body by its resistance.
10. State and explain law of conservation of linear momentum.

PART – B

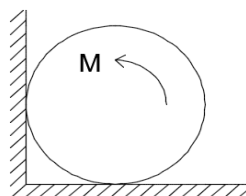
Answer any four questions.

(4x15 = 60 Marks)

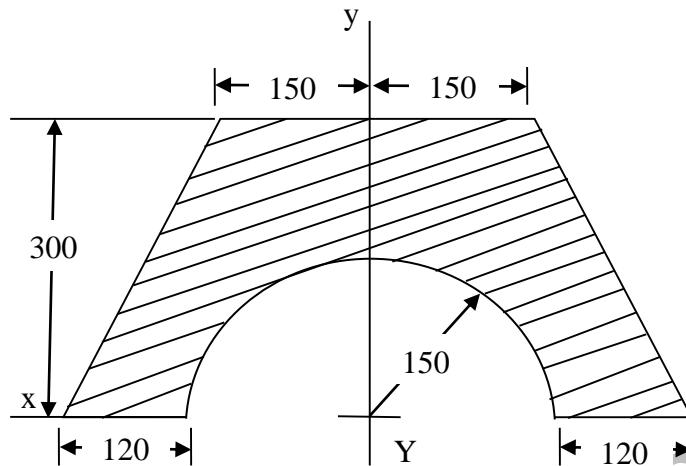
11. Three bars hinged at A and D, and pinned at B and C form a four link mechanism as shown in fig.1. Determine the value of P which will prevent motion.



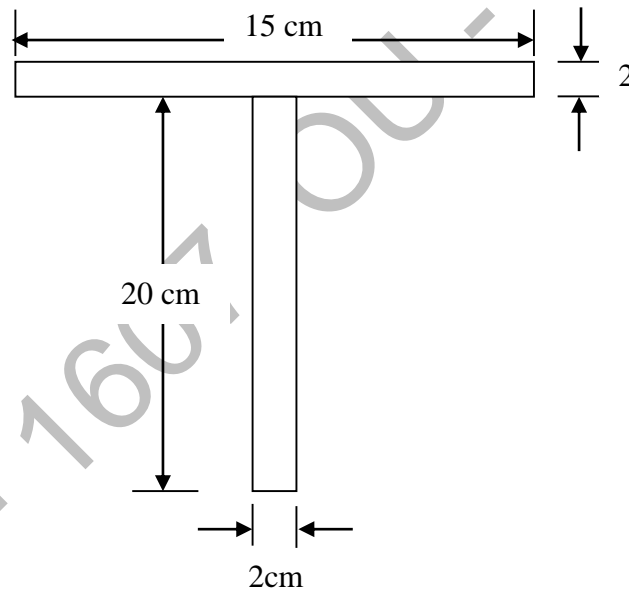
12. A homogeneous cylinder of weight 300N and radius 1m rests on a horizontal surface in contact with a vertical wall as shown in fig. If the coefficient of friction at all contact surfaces is 0.3, determine the couple 'M' acting on the cylinder which will start anti clockwise rotation



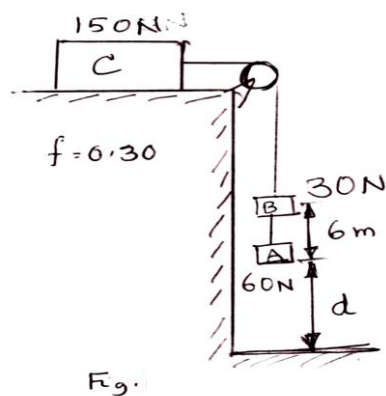
13. Determine area centroid of the shaded area shown in fig below.



14. Determine moment of inertia of the T section with respect to centroidal axis xx and also about its base line.

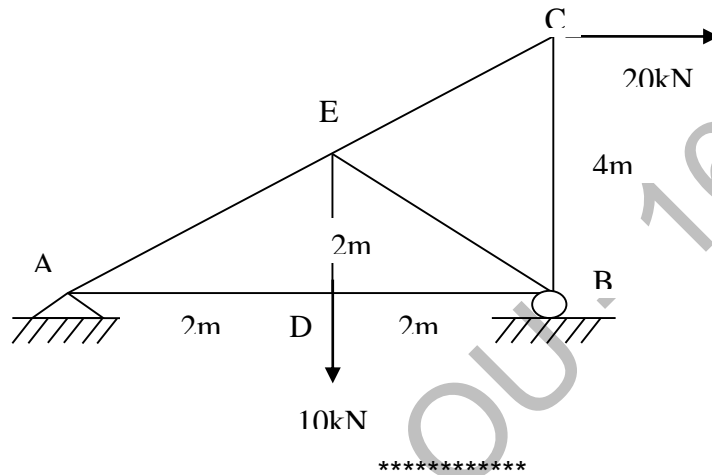


15. The system fig is connected by flexible inextensible cords. If the system starts from rest, find the distance d between A and the ground so that the system comes to rest with body B just touching A



16. a) A 600mm diameter flywheel is brought uniformly from rest to a speed of 350 rpm in 20 seconds. Determine the velocity and acceleration of a point on the rim 2 seconds after starting from rest.
- b) The velocity of a particle moving in a straight line is given by the expression $V = 2t^3 - t^2 - 2t + 4$. The particle is found to be at a distance of 10m from station A after 2 seconds. Determine
- acceleration
 - displacement after 6 seconds.

17. Find forces in all the members of given truss.



FACULTY OF ENGINEERING
B.E. (ECE) III-Semester (AICTE) (Backlog) Examination, November 2021

Subject: Elements of Mechanical Engineering

Time: 2 hours

Max. Marks: 70

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Detail the classification of Gas turbine.
- 2 What are the IC engines role in industries?
- 3 State the Stefan-Boltzmann Law of radiation.
- 4 List the advantages and limitations of heat exchangers.
- 5 Classify the different types of centrifugal pumps.
- 6 Draw the diagram of Francis turbines.
- 7 State two conditions on which belt drive is preferred over gear drive in power transmission.
- 8 Define velocity ratio of a compound belt drive and slip of it.
- 9 State different types of welding.
- 10 Sketch any one drilling machine and mention important compounds.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Explain with neat sketches working of four-stroke diesel engine.
(b) Derive the specific fuel consumption of the petrol engine.
- 12 (a) Derive the methods of classification of Heat Exchanger.
(b) Explain the modes of heat transfer in the following :
(i) Metal rod is heated at 50°C (ii) Water boiling of 100°C
(iii) Furnace wall is maintained at 800°C.
- 13 Explain about Pelton wheel and explain the calculation of overall efficiencies.
- 14 (a) Compare compound gear train and Reverted gear train.
(b) Derive the ratio of tensions of flat belt with neat diagram.
- 15 (a) Compare up milling and down milling.
(b) Explain with a neat sketch the Oxy-Acetylene welding.
- 16 (a) Explain with a neat diagram the working of ARC welding system and also mention its engineering applications.
(b) The tension on tight side of a belt is 300kg and the angle of lap is 160°. If the coefficient of friction is 0.3 find the tension on the slack side of the belt.
- 17 (a) Explain the working of diesel engine with P – V diagram.
(b) Explain the about counter flow heat exchangers.

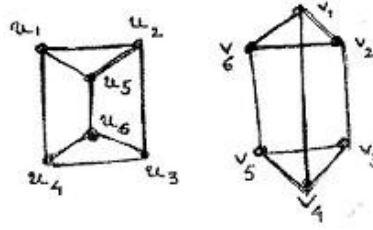
FACULTY OF ENGINEERING**B.E. (CSE) III-Semester (AICTE) (Main) Examination, November 2021****Subject: Discrete Mathematics****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any, may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

- 1 Write Truth Table for any one of the De Morgan's Laws
- 2 Data stored on a computer disk are usually represented as a string of bytes. Each byte is made up of 8 bits. How many bytes are required to encode 100 bits of data?
- 3 Find the number of different strings can be made by reordering the letters of the word SUCCESS?
- 4 How many different license plates are available if each plate contains a sequence of two letters (alphabets from A to Z) followed by three digits (0 to 9)?
- 5 Solve the Recurrence relation $a_n + 8a_{n-1} + 16a_{n-2} = 0$
- 6 For a given discrete random variable x, expected value of x is 0.39 and $E(x^2) = 0.654$ Find variance of the random variable x.
- 7 Mention operations that can be performed on an n-ray relation on any given Database
- 8 Differentiate between R^n and R^* on any relation on a given set
- 9 Spanning Trees are obtained by removing edges from any given Graph. Can you form Spanning Trees in any other way? If so, what are those?
- 10 What is the output if an AND gate and a NAND gate are connected to an OR gate?

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

- 11 a) Are $p \vee (q \wedge r)$ and $(p \vee q) \wedge r$ Logically Equivalent?
b) Find a big – O estimate for $f(x) = (x+1) \cdot \log(x^2 + 1) + 3x^2$
- 12 a) Solve Fibonacci's Recurrence relation with conditions $F_0 = 1$ and $F_1 = 1$
b) In which order should the matrices A_1, A_2 and A_3 , where A_1 is 30 X 20 matrix, A_2 is 20 X 40 matrix and A_3 is 40 X 10 matrix, all with integer entries, be multiplied to get the least number of multiplications.
- 13 a) What is the expected value and variance of the sum of the numbers that appear when a pair of fair dice is rolled?
b) Explain Towers of Hanoi Problem and find its recurrence relation

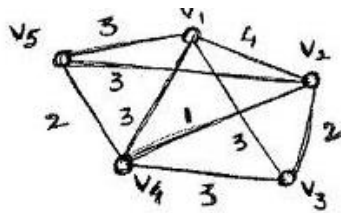
14 a) Verify whether the following Graphs are Isomorphic



b) Draw the Hasse Diagram representing the partial ordering relation $\{(a,b) \mid a \text{ divides } b\}$ on $\{1, 2, 3, 4, 6, 8, 12\}$ also find maximal and minimal elements

15 a) Compare BFS and DFS algorithms

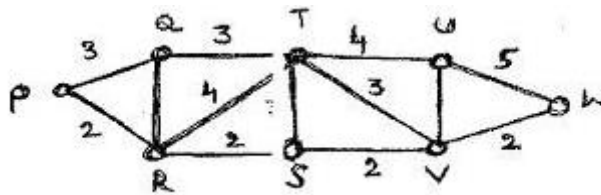
b) Derive a Minimum Spanning Tree from the given weighted Graph by Prim's algorithm



16 a) How many solutions does the equation $x_1 + x_2 + x_3 = 11$ have, where x_1, x_2 and x_3 non-negative integers.

b) Draw graphs of Big-O, Big- Ω and Big- θ notations and also write the order of growth of functions of algorithms.

17 a) Find the shortest path between the source node P and the destination node W from the given weighted Graph by Dijkstra's algorithm



b) Create two relations on databases where R be a relation of degree 4 and S be a relation of degree 3 and find join operation J_2 on the relations R and S.

FACULTY OF ENGINEERING**B.E. III - Semester (CME) (Backlog) Examination, November 2021****Subject: Basic Electronics Engineering****Time: 2 Hours****Max. Marks: 70****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer any five questions.****(5x2 = 10 Marks)**

- 1 What is ripple factor? What is its value for HW and FW rectifier without Filter?
- 2 Define Cut-in voltage of diode. What is its value for Si and Ge diode?
- 3 Write the differences between BJT and FET.
- 4 Define α and β .
- 5 Derive an expression for the gain of the amplifier with feedback.
- 6 Give the Barkhausen Conditions required in order for sinusoidal oscillations to be sustained.
- 7 Define the terms CMRR and Slew rate of Op-amp.
- 8 Give the truth table of Half-Subtractor.
- 9 Explain Gauge factor for a strain Gauge.
- 10 Draw the circuit diagram of R-2R ladder type digital to analog converter.

PART – B**Note: Answer any four questions.****(4x15 = 60 Marks)**

- 11 (a) Derive the value for ripple factor and efficiency of Full wave Rectifier.
(b) What is TUF? What is its significance?
- 12 (a) Explain the input and output characteristics of CB configuration.
(b) Explain the working of JFET and also describe the drain and transfer characteristics.
- 13 (a) Derive the general equation for LC Oscillator.
(b) Show how the input and output impedance of voltage-series feedback varies using block diagram.
- 14 (a) Draw the Full-subtractor with its truth table. Draw it only using NAND gate.
(b) Write short notes on Successive approximation ADC.
- 15 (a) Explain the operation of RC phase shift Oscillator.
(b) Define CMRR and Slew rate.
- 16 (a) Analyze Voltage-shunt feedback circuit with neat block diagram.
(b) With neat block diagram explain briefly about Flash Analog to Digital Converter.
- 17 Write short notes on:
(a) Negative feedback (b) JFET (c) Op-amp as integrator.

FACULTY OF ENGINEERING
B.E. III - Semester (IT) (AICTE) (Backlog) Examination, November 2021

Subject: Mathematical Foundations of I.T

Time: 2 Hours

Max. Marks: 70

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

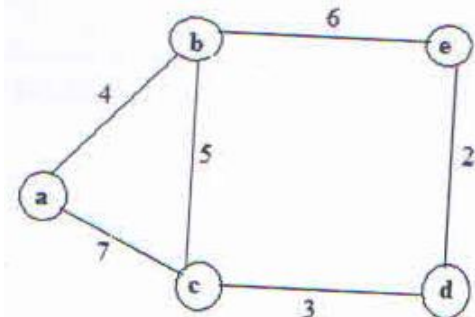
- 1 Define free and bound variables.
- 2 List out various truth table for logical implication and logical disjunction.
- 3 What is lattice?
- 4 Memorize various onto, one to one, one to one onto functions.
- 5 Find the number of arrangements of letters "MISSISSIPPI".
- 6 Define counting.
- 7 What are homogenous recurrence relations?
- 8 What is Fibonacci relation and list out its properties?
- 9 What is chromatic number?
- 10 Define Directed graph.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 Explain detail about the following
 - (a) Principal Disjunctive normal form
 - (b) Principal Conjunctive normal form.
- 12 (a) Explain clearly about properties of binary relation.
 (b) Distinguish between digraph and hasse diagram.
- 13 (a) Illustrate pigeon hole principle and its applications.
 (b) Solve $(2x-3y+4z)^3$ using multinomial theorem.
- 14 (a) Find a general expression for a solution to the recurrence relation
 $a_n - 5a_{n-1} + 6a_{n-2} = 4^n$ for $n \geq 2$ homogenous linear recurrence relation.
 (b) Use partial fraction to compute $\frac{x+21}{(x-5)(2x+3)}$.
- 15 (a) Find the spanning tree from graph G



- (b) Explain about Isomorphism and Euler Circuit.

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- 16 (a) Show that $R \rightarrow S$ can be derived from the premises.
(b) Explain clearly about rules of inference.

- 17 Discuss the following topics:
(a) Properties of lattice.
(b) Steps for finding Inverse function.

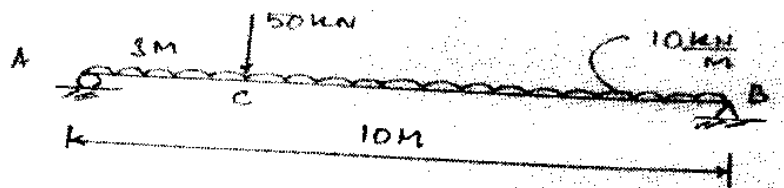
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FACULTY OF ENGINEERING**BE III-Semester (CBCS) (Backlog) (Civil) Examination, November 2021****Subject: Strength of Materials – I****Time: 2 Hours****Max marks: 70****Missing data, if any may be suitably assumed****PART – A****Note: Answers any Five questions.****(5x2=10 Marks)**

1. Define malleability and brittleness
2. Draw stress, strain curve for ductile material
3. Explain temperature stress in a indeterminate bar
4. Explain poisson's ratio
5. Give the relationship between SF, BM and intensity of loading
6. What is meant by modulus of rupture?
7. Write the assumption made in the theory pure flexure
8. Difference between axial rigidity and flexural rigidity
9. Explain shrinkage stresses in compound cylinders
10. Write the principle of shear center

PART - B**Note: Answers any Four questions.****(4x15=60 Marks)**

11. Draw SFD and BMD of the given beam



12. Derive the relation between shear modulus, bulk modulus and elastic modulus from the fundamentals.
13. Calculate the increase in volume of thin cylinder 2m long internal diameter 1.2 meters and 15mm thick. If it is subjected to an internal pressure of 8MPa. Take $E = 200\text{GPa}$ and $\mu =$ poissorls ratio
14. A 300mm x 300mm timber section is strengthened by the addition of a 300mm x 6.25mm steel plates secured to its top and bottom surfaces. The composite beam is simply supported at its ends and carries a UDL of 25kN/m over an effective span of 6m. Find maximum flexural stress in steel and timber at mid span. Take $E_s = 200\text{GPa}$, $E_t = 100\text{GPa}$
15. Sketch the shear stress distribution across the section of An I-section beam 340mm deep and 180mm wide has web thickness of 6mm and flange thickness 16mm. It carries a shear force of $200 \times 10^3 \text{ N}$.
16. Draw Mohr's circle of stress for direct stresses of 150MPa (T) and 60 MPa (T). From Mohr's circle of stress find
 - i. The magnitude and direction of resultant stress on a plane making an angle of 60° with plane of minor principle stress.
 - ii. The magnitude and direction of maximum shear stress
 - iii. The normal and resultant stresses on a plane of maximum shear stress

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17. Write short notes on
- i. Bars of uniform strength
 - ii. Equivalent force couple system
 - iii. Shear center

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FACULTY OF ENGINEERING

BE III Semester (CBCS) (EEE) (Backlog) Examination, November 2021

Subject: Electrical Circuits – I

Time: 2 Hours

Max marks: 70

Missing data, if any may be suitably assumed

PART – A

Note: Answers any Five questions.

(5x2=10 Marks)

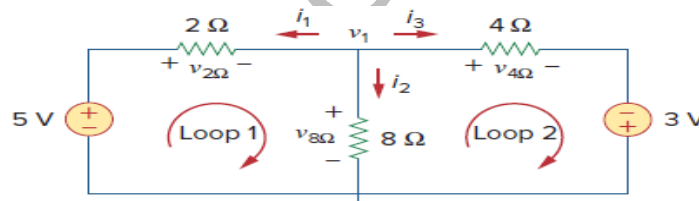
- 1) Distinguish between KCL & KVL
- 2) Distinguish between Active & Passive Elements
- 3) Discuss Energy stored in capacitance
- 4) Define Band-width and Q-factor.
- 5) State Maximum power transfer theorem
- 6) Differentiate between Star and delta connections
- 7) Discuss response of RC Circuit
- 8) What is second order system?
- 9) Prove that at any instant of time the sum of the induced voltages in a 3 ph circuit is zero
- 10) Draw current locus diagrams of RL and RC series circuits

PART - B

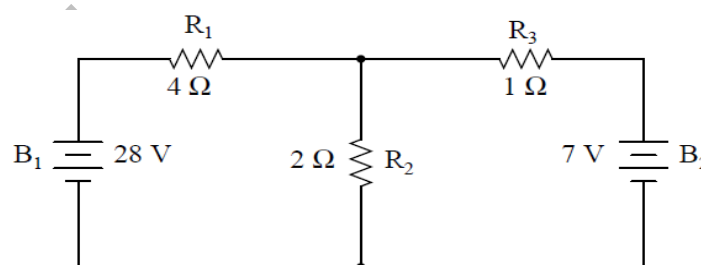
Note: Answers any Four questions.

(4x15=60 Marks)

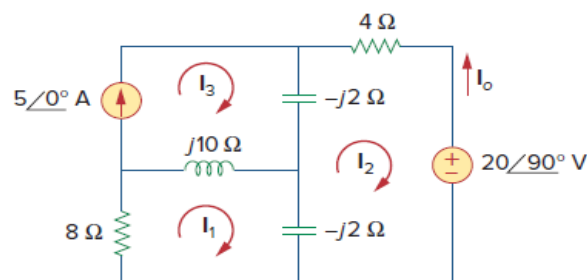
- 11) Find the node voltages by node voltage analysis method.



- 12) Find Currents through all branches using MILMANS THEORM

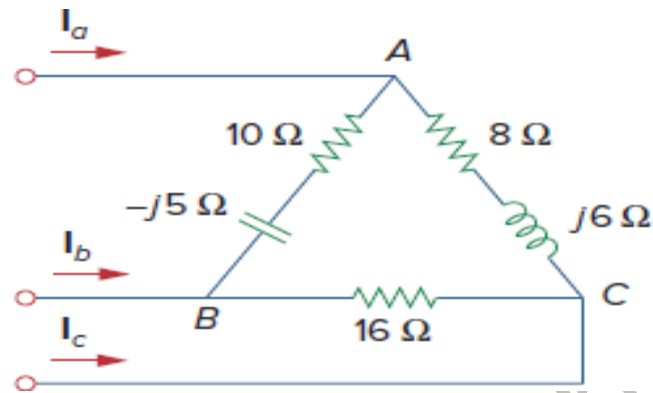


- 13) Determine current I_o in the circuit of Fig. below using mesh analysis.

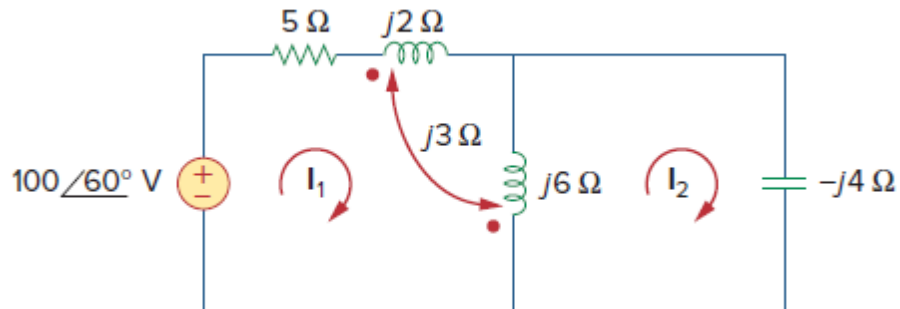


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- 14) The unbalanced Δ -load of Fig. below is supplied by balanced line-to-line voltages of 440 V in the positive sequence. Find the line currents. Take V_{ab} as reference



- 15) Determine the Phasor currents I_1 and I_2 in the circuit of Fig. below



- 16) Determine the phase sequence of the set of voltages

$$V_{an} = 200 \cos (\omega t + 10^\circ)$$

$$V_{bn} = 200 \cos (\omega t - 230^\circ),$$

$$V_{cn} = 200 \cos (\omega t - 110^\circ)$$

- 17) a) Discuss Source transformations.

- b) Discuss Measurement of three-phase power for balanced loads.

FACULTY OF ENGINEERING**B.E. (ECE) III-Semester (CBCS) (Backlog) Examination, November 2021****Subject: Signal Analysis and Transform Technique****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any, may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

- 1 Define Causal system.
- 2 Find $x(-t)$ and $x(t-1)$ if $x(t)$ is an impulse signal.
- 3 What are the analogy of vectors and signals?
- 4 Check whether the signal $x(t) = \cos 3\pi t + \sin 5\pi t$ is periodic or not.
- 5 State initial and final value theorem in Laplace transform.
- 6 Find the Fourier transform of $f(t) = e^{2t}u(-t)$.
- 7 Find the final value of $X(Z) = 1 - 3Z^{-1} / 1 + 6Z^{-1} - 4Z^{-2}$.
- 8 Find the Z-transform of $x(n) = \{-1, 4, 5, 7\}$.
- 9 State the properties of auto correlation.
- 10 Define Aliasing.

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

- 11 (a) Check whether the system is linear or non-linear and Time Invariant or Variant for the equation $y(t) = x^2(t)$.
(b) Sketch time shifting, time reversal, time scaling and amplitude scaling for $X(t) = u(t) - u(t - 2)$.
- 12 (a) Obtain the Exponential Fourier series for the full wave rectified signal.
(b) State and prove any two properties of cross correlation.
- 13 (a) State and prove any three properties of Fourier transform.
(b) Find the impulse response of the system described by the differential equation $d^2y(t) / dt^2 - 10dy(t) / dt - 24y(t) = x(t)$. Assume zero initial condition.
- 14 (a) For the given $x(t) = u(t - 3)$ and $h(t) = u(t)$. Find the linear convolution using graphical method.
(b) What are the various classification of discrete time systems?
- 15 (a) Find the Z-transform for $x(n) = (1/3)^n u(n) - (1/2)^n u(-n - 1)$ and plots its ROC.
(b) Determine the impulse response for the system described by the difference equation $y(n + 2) + y(n + 1) - 12y(n) = x(n)$. Assume zero initial condition.
- 16 (a) Find the inverse Z-transform for $X(Z) = 1 + 5Z^{-1} / 1 - 3Z^{-1} + 2Z^{-2}$, if ROC $|z| > 1$.
(b) Find the inverse Laplace transform for $X(s) = s + 3 / (s - 5)(s^2 - 3s - 21)$.
- 17 (a) Write short notes on discrete Fourier series.
(b) Write a note on LTI system.
(c) State and improve Parseval's energy theorem in Fourier transform.

FACULTY OF ENGINEERING**B.E. III-Semester (CBCS) (M/P) (Backlog) Examination, November 2021****Subject: Metallurgy and Material Science****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any, may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

- 1 Distinguish between Edge and Screw dislocation.
- 2 What is Baushinger effect?
- 3 What is Cumulative fatigue?
- 4 Explain Fick's first law of diffusion.
- 5 Define phase diagram.
- 6 Distinguish the terms solid solution, mixture and compound with examples.
- 7 Differentiate between austempering and martempering.
- 8 What is age hardening?
- 9 What are the different types of stainless steel?
- 10 What are the different methods to extract aluminium?

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

- 11 a) Discuss Griffiths theory of brittle fracture.
b) List out the differences between cold working and hot working.
- 12 a) Explain the experimental determination of fatigue strength with a neat sketch.
b) What is creep? Explain the various regions in the creep curve with suitable diagram.
- 13 a) Draw Iron-Iron carbide equilibrium diagram, label all the areas and list out various reactions.
b) How cast irons are classified and explain the characteristics of cast irons?
- 14 a) Explain Austenite to Martensite transformation of eutectoid steel with help of TTT curves?
b) What is annealing? What are the different types of annealing process? Explain.
- 15 a) Explain the Bessemer process with a neat diagram.
b) Explain the composition, properties and applications of Ti-6Al-4V alloy?
- 16 a) What are the difference between thermoplastics and thermosetting plastics?
b) Explain classification of composites.
- 17 Write a short note on the following:
 - a) Hume-Rothery rules of solid solutions
 - b) Applications of polymers.
 - c) Creep curve

FACULTY OF ENGINEERING**B.E. (AE) III Semester (CBCS) (Backlog) Examination, November 2021****Subject : Thermal Engineering****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any, may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

- 1 What do you mean by a thermodynamic system.
- 2 Define microscopic approach.
- 3 Distinguish between Nozzle and Diffuser.
- 4 What do you understand by PMM2.
- 5 Define COP for a Refrigerator.
- 6 Define dryness fraction of steam.
- 7 Define following terms
 - a) Ton of Refrigeration
 - b) COP of heat pump
- 8 Explain the effect of Regeneration in gas turbines.
- 9 Define free air delivery in Reciprocating Air Compressor.
- 10 Define Fuel Cell.

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

- 11 a) What is meant by thermodynamic equilibrium? Explain with the help of examples.
 - b) What is meant by SFEE and derive it and reduce it for the turbine.
- 12 a) Define perpetual motion of first kind (PMM1)? Why it is impossible.
 - b) A turbine unit developing 15MW power has at its inlet $h_1=1100\text{KJ/kg}$ and $V_1=50\text{m/s}$. At the exit $h_2 = 300 \text{ KJ/kg}$ and $V_2=200\text{m/s}$. If the mass flow rate through turbine is 20kg/s , calculate the rate of heat rejection from the turbine.
- 13 a) Derive the equation for work transfer of poly tropic process.
 - b) Prove that Kelvin Planck's and clausius statements of second law are equivalent.
- 14 For a two stage reciprocating air compressor, obtain. Expression for work done and Isothermal efficiency. What is the condition on intermediate pressure for minimum work.
15. Explain working principle of vapour compression refrigeration system with neat sketch with neat sketch and draw the cycle on T-S and P-h diagram.
16. With the help of neat diagram explain the working Principle of a reheat. Brayton cycle and represent the cycle on T-S diagram.
- 17 a) Derive the equation for volumetric efficiency of a compressor in terms of clearance ration and pressure ratio.
 - b) Discuss the advantages of hydrogen cell.

FACULTY OF ENGINEERING**B.E. III SEM (CBCS) (CSE) (Backlog) Examination, November 2021****Subject: Discrete Mathematics****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any, may be suitably assumed.****PART – A****Answer any five questions.****(5x2 = 10 Marks)**

1. Construct the truth table of the formula $P \rightarrow (Q \wedge R)$
2. Define converse and contra positive of an implication $P \rightarrow Q$.
3. State the pigeonhole principle.
4. Define an equivalence relation.
5. Give an inductive definition of the factorial function $F(n) = n!$.
6. Construct the Hasse diagram for the poset $(\{1,2,3,4\}, \leq)$.
7. Define a) Hamilton Cycle b) Complement of a graph
8. Define a minimum spanning tree. Give example.
9. Define semigroup and monoid.
10. Define group homomorphism.

PART – B**Answer any four questions.****(4x15 = 60 Marks)**

11. a) Show that $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent using truth table method.
b) Show that $\sim(p \vee (\sim p \wedge q))$ and $\sim p \wedge \sim q$ are logically equivalent by developing a series of logical equivalences.
12. a) Use mathematical induction to show that $1+2+2^2+\dots+2^n=2^{n+1}-1$ for all nonnegative integers n .
b) Prove that $\sqrt{2}$ is irrational using proof by contradiction.
13. a) Find an explicit formula for the Fibonacci numbers.
b) Find all the solutions of the recurrence relation $a_n=3a_{n-1}+2n$. What is the solution with $a_1=3$?
14. a) Prove that a tree with n vertices has $n-1$ edges.
b) State and prove the Euler's formula.
15. a) Explain Kruskal's algorithm to find the minimal spanning tree of a graph with an example.
b) Is there a graph with degree sequence $(1,3,3,3,5,6,6)$? Justify your answer.
16. a) What are the properties of an algebraic system?
b) Prove that the union of two sub groups is not a group.
17. Write short notes on the following.
 - a) Graph Isomorphism
 - b) Chromatic number of a graph.

FACULTY OF ENGINEERING
B.E. III - Semester (CBCS) (IT) (Backlog) Examination, November 2021
Subject: Discrete Mathematics

Time: 2 Hours

Max. Marks: 70

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any five questions. (5x2 = 10 Marks)

- 1 Give a direct proof of the theorem “if n is an odd integer, then n^2 is odd”.
- 2 Find $2^{644} \pmod{645}$.
- 3 What is difference between binary tree and spanning tree?
- 4 What is meant by logic gate? Give an example.
- 5 Explain concept of graph coloring with example.
- 6 Differentiate between planar and non-planar graph.
- 7 How many 9 letter palindromes are possible using English alphabets?
- 8 How can we produce terms of sequence if first 10 terms are 5,11,17,23,29,35,41,47,53,59?
- 9 What is derangement and write its representation?
- 10 Find number of 4-combinations of these letters A,E,I,O,U if repetition is allowed.

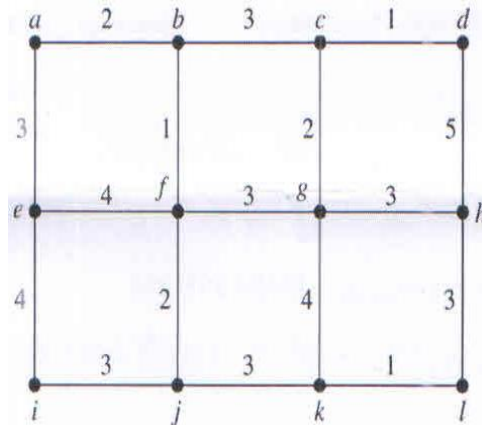
PART – B

Note: Answer any four questions. (4x15 = 60 Marks)

- 11 Construct truth table for $(P \leftrightarrow Q) \leftrightarrow (R \leftrightarrow S)$.
- 12 Write the factorial proof of pascal's identity.
- 13 (a) Each user on a computer system has a password, which is 6 to 8 characters long where each character is an uppercase letter or a digit. Each password must contain atleast one digit. How many possible passwords are there?
(b) How many different strings can be made by reordering the letters of the words SUCCESS & MISSISSIPPI?
- 14 Find the solution for recurrence relation $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ with initial conditions $a_0=2, a_1=5, a_2=15$.
- 15 (a) Show that an undirected graph has even number of vertices with odd degree.
(b) Explain about rules to construct hassee diagram and give an example for it.

..2..

16 Use Prim's algorithm to find a minimum spanning tree of G.



17 Write short notes on

- Tree traversals
- Inclusion-Exclusion principle
- Variance and Standard Deviation.

FACULTY OF ENGINEERING
B.E. 2/4 (EEE) I-Semester (Backlog) Examination, November 2021

Subject: Principles of Mechanical Engineering

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any seven questions.

(7x3 = 21 Marks)

- 1 What is the concept of black body?
- 2 Give the classifications of gas turbines.
- 3 What do you mean by TON of refrigeration?
- 4 Give the applications of heat exchangers in industries.
- 5 What is the working principle of Francis?
- 6 What is the working principle of reciprocating pump?
- 7 List out the types of gear trains.
- 8 Define velocity ratio in belt drives.
- 9 List out the advantages of diesel engines over petrol engines.
- 10 What is meant by specific speed of hydraulic turbine?

PART – B

Answer any three questions.

(3x18 = 54 Marks)

- 11 (a) Explain the working of SI engine with a neat sketch and draw its P – V diagram.
(b) Give the classification of boiler along with its application.
- 12 (a) Derive the expression for steady flow energy equation.
(b) Classify heat exchangers with a neat sketch and give their applications.
- 13 Explain with a neat sketch the working principle of
 - (a) Pelton wheel turbine
 - (b) Centrifugal pump
- 14 (a) Explain the working of a compound gear train with neat sketch and give its applications.
(b) Derive the expression for the condition for maximum power for belt drive.
- 15 (a) Derive Bernoulli's equation and give its applications.
(b) Derive equation for work done and output power for Francis's turbine.
- 16 (a) Explain the concept of air vessels in pumps.
(b) Explain the cavitation in pumps.
- 17 Write short notes on the following:
 - (a) Friction losses in pipes
 - (b) Mechanical efficiencies of an IC engine
 - (c) Eco friendly refrigerants

FACULTY OF ENGINEERING
B.E. 2/4 (EIE) I-Semester (Backlog) Examination, November 2021

Subject: Element of Production Techniques

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any seven questions.

(7x3 = 21 Marks)

- 1 Classify various Manufacturing Processes.
- 2 Write the types of Sand Castings.
- 3 Differentiate between consumable and non-consumable electrodes?
- 4 What is Brazing operation?
- 5 Write the different types of operations that can be performed on Lathe Machine.
- 6 What is Shaping Operations?
- 7 Mention the applications of Abrasive jet Machining.
- 8 What are NC machines?
- 9 Give the applications of Forging Operations.
- 10 Write the concept of wire drawing.

PART – B

Answer any three questions.

(3x18 = 54 Marks)

- 11 (a) Explain the Sand casting with schematic diagram.
(b) Give the criteria for selection of manufacturing process.
- 12 (a) Differentiate between Brazing and soldering operations.
(b) Explain the concept of Gas welding with neat sketch.
- 13 (a) Briefly describe the Process parameters affecting the Arc Welding.
(b) Write the differences between Lap weld and Butt weld.
- 14 (a) With the help of schematic diagram explain the working of Milling Machine
(b) Differentiate between CNC and DNC machine.
- 15 Write working of :
(a) Drilling machine
(b) Abrasive Jet Machining
- 16 (a) Explain the working of Electro Discharge Machining.
(b) What are the applications of Ultrasonic machining?
- 17 Write short notes on:
(a) Extrusion Process
(b) Deep drawing Process

FACULTY OF ENGINEERING**B.E. 2/4 I - Semester (ECE) (Backlog) Examination, November 2021****Subject: Elements of Mechanical Engineering****Time: 2 Hours****Max. Marks: 75****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer any seven questions.****(7x3 = 21 Marks)**

- 1 Explain the term reversibility as applied to a thermodynamic process.
- 2 Give the differences for SI engines and CI engines.
- 3 State Steffen Boltzmann law of radiation.
- 4 What is the principle of sand casting?
- 5 What are the desirable properties of refrigerants?
- 6 What are the advantages of multistage compressors?
- 7 List out the various psychometric processes.
- 8 Write the condition for maximum power transmitted by belt drive.
- 9 List out operations carried out on lathe machine.
- 10 What is mechanism and machine?

PART – B**Note: Answer any three questions.****(3x18 = 54 Marks)**

- 11 a) Derive the expression for clausius inequality.
b) With a neat sketch explain the working of 4 stroke diesel engine.
- 12 a) A reversible engine receives heat from a reservoir at 700°C and rejects heat at temp. T₂. A second reversible engine receives the heat rejected by the first engine and rejects to a sink at temperature 37°C. Calculate the Temp. T₂ for equal work output of both the engines.
b) Explain Newton's law of cooling.
- 13 a) With the help of a neat block diagram, explain the working of ammonia water refrigeration system. Show the cycle on T-S and P-H diagrams.
b) What is heating and humidification process? Represent it on psychometric chart?
- 14 a) Explain the principles of the following machining processes.
1) Turning 2) Milling 3) Grinding.
b) Explain die casting process and state advantages and limitations of the process.
- 15 Derive expression for length of open belt drive with help of neat sketch.
- 16 a) Derive LMTD in counter-flow heat exchanger with help of neat sketch.
b) Discuss about simple and compound gear trains
- 17 Write short notes on any 4 of the following:
 - a) Condition for maximum power transmission for flat belt
 - b) Specific fuel consumption
 - c) Classification of heat exchangers
 - d) Differentiate intensive and extensive properties of a thermodynamic system
 - e) Effect of clearance volume in reciprocating air compress.

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) I - Semester (Backlog) Examination, November 2021

Subject: Strength of Materials – I

Time: 2 Hours

Max. Marks: 75

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

PART – A

Note: Answer any seven questions.

(7x3 = 21 Marks)

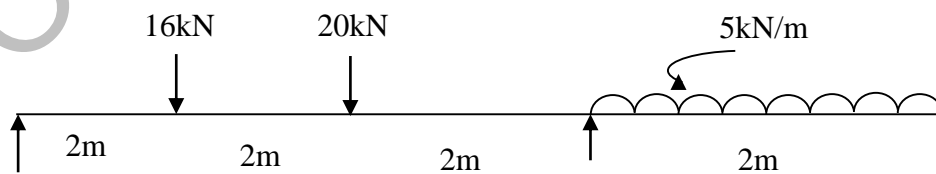
1. Define Hooke's law.
2. Mention any four types of beams.
3. What is section modulus and its importance?
4. What is a core of a section?
5. Explain stresses under self weight in spherical shells.
6. Mention the various methods of theories of failure.
7. Differentiate between method of joints and method of sections. Explain equivalent bending and torsional moment.
8. Explain ellipse of stress with neat sketch.
9. Draw stress- strain curve for mild steel with salient points.

PART – B

Note: Answer any three questions.

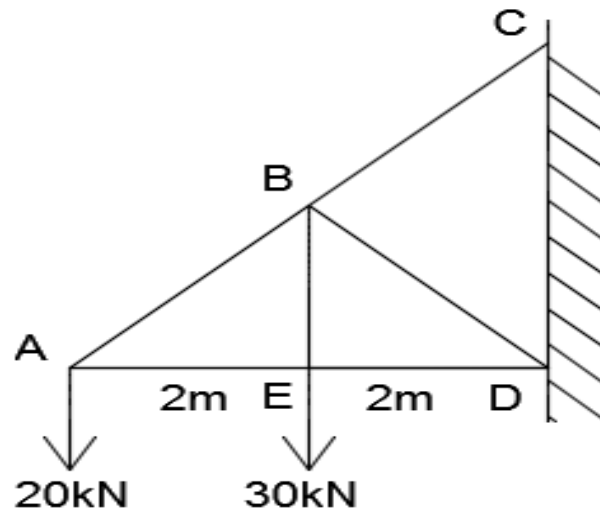
(3x18 = 54 Marks)

11. The X, Y, and Z axes are oriented along the length, width and thickness of a rectangular block 200 x 120 x 100 mm. It is subjected to axial forces in the 3-directions: $P_x = 120\text{kN}$ (Tensile), $P_y = 75\text{kN}$ (Tensile) and $P_z = 100\text{kN}$ (compressive). Calculate the stresses and strains in the 3 directions, volumetric strain and change in volume, taking modulus of elasticity = $2 \times 10^5\text{N/mm}^2$ and Poisson's ratio = 0.25.
- 12 . Draw shear force and bending moment diagrams for the beam shown in figure



13. A beam of I section is 250mm deep and 200mm wide. The flanges are 20mm thick and web 15mm thick. Sketch the shear stress distribution across the depth of the section for a shear force at a section is 90 kN.

14. A rectangular strut is 200mm wide and 100mm thick. It carries a load of 30kN at an eccentricity of 15mm in a plane bisecting the thickness. Find the maximum and minimum intensities of stress in section
15. Find the forces in all the members of the truss shown below by method of joints Take distance CD = 4m



16. (a) A simply supported rectangular beam of span 6m carries a u.d.l of 18kN/m over its full span. Calculate the width and depth of the section for a limiting bending stress of 21N/mm^2 . Take depth of the beam as twice its width.
- (b) If the modulus of elasticity and bulk modulus of a material are 200GPa and 130GPa, find poisson's ratio and modulus of rigidity.
17. At a point in a strained material is subjected to mutually perpendicular stresses of 500N/mm^2 tensile and 300N/mm^2 compressive. It is also subjected to a shear stress of 200N/mm^2 . Draw Mohr's circle of stress and find the principal stresses, principal planes and maximum shear stress

FACULTY OF ENGINEERING**B.E. 2/4 I – Semester (M/P / AE) (Backlog) Examination, November 2021****Subject: Managerial Economics and Accountancy****Time: 2 Hours****Max. Marks: 75****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer any seven questions.****(7x3 = 21 Marks)**

- 1 Define Macro economics.
- 2 Differentiate Risk and uncertainty.
- 3 Draw a sample Demand schedule.
- 4 What are Variable costs?
- 5 Define Production function.
- 6 Distinguish between AC and MC.
- 7 Compare Fixed capital and working capital.
- 8 Write a note on payback period.
- 9 Write about the Rules of double entry system.
- 10 What is Debt-Equity Ratio?

PART – B**Note: Answer any three questions.****(3x18 = 54 Marks)**

- 11 Explain the characteristics and uses of Managerial economics.
- 12 Define demand forecasting. What are the methods used for demand forecasting?
- 13 Explain the relationship between AC and MC with the help of diagram.
- 14 What is perfect competition? How is price determined under perfect competition?
- 15 A company has two projects for investment X and Y. A discount rate of 15% is used to evaluate the project. Which project will you select under NPV?
The cash flows after taxes are

Year	Project X(Rs)	Project Y(Rs)
Investment	160000	200000
1	140000	72000
2	48000	16000
3	16000	100000
4	28000	200000
5	26000	48000

..2..

16 Define BEP. Explain it with the help of a chart. What are its uses and limitations?

17 From the following information, prepare BRS of Murthy traders as on Dec 31, 2020

- (a) Bank balance as for cash book Rs.100000.
- (b) Cheque issued but not presented for payment Rs. 28000.
- (c) Cheques deposited into bank but not credited upto Dec31, 2018 Rs.21200.
- (d) Bank credited Rs.14000 for receiving dividend through electronic clearing system
- (e) Bank charges debited by bank Rs.500.

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FACULTY OF ENGINEERING**B. E. 2/4 (CSE) I – Semester (Backlog) Examination, November 2021****Subject: Basic Electronics****Time: 2 hours****Max. Marks: 75***(Note: Missing data, if any, may be suitably assumed)***PART – A****Answer any seven questions.****(7 x 3 = 21 Marks)**

1. Differentiate between an intrinsic and extrinsic semiconductor.
2. State the hall effect in semiconductor.
3. Draw h-parameter model of a common base configuration.
4. Explain zener voltage regulator with help of a circuit diagram.
5. What is an oscillator? And state the Barkhausen criterion.
6. Define LED and Photodiode.
7. Draw the truth table of Half Adder. Show its equivalent circuit.
8. How the transistor amplifies the input-signal? Explain.
9. Compare LED and LCD.
10. Why is SCR known as negative feedback?

PART – B**Answer any three questions.****(3 x 18 = 54 Marks)**

11. a) What are the types of semiconductor? Explain the working of PN junction diode with V-I characteristics.
b) A Centre tapped transformer has a 220v primary winding and a secondary winding rated at 12-0-12 v' and is used in a full wave rectifier circuit with a load of 100Ω. What is the dc output voltage dc load current and PIV rating required for diodes.
12. a) Show the JFET transconductance $g_m = g_{m0} [1 - (V_{GS}/V_P)]$
b) Draw and explain a simple inverter circuit using FET.
13. a) Draw a block diagram of current series feedback amplifier obtain the expression for R_{if} , A_{vf} and R_{of} .
b) An amplifier required an input signal 60 mv to produce certain output with a negative feedback to get the same output, the required input signal is 0.5V. the voltage gain with feedback is 80. Find the open loop gain and feedback factor.
14. a) Classify negative feedback amplifiers. Compare their performance in a tabular column.
b) Realize the full adder using basic gates.
15. a) How operational amplifier is used as integrator and differentiator?
b) Draw the OP-amp summing amplifier circuit and obtain an expression for the output voltage for 4 inputs.
16. a) What are the applications of op-amp? Explain any two with proper expression.
b) What is meant by skew rate in an op-amp?
17. a) Explain the construction and working of LVDT.
b) With the help of CRO block diagram explain its operation.

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FACULTY OF ENGINEERING
B.E. 2/4 (I.T) I – Semester (Backlog) Examination, November 2021
Subject: Data Structures

Time: 2 Hours

Max. Marks: 75

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

PART – A**Note: Answer any seven questions.****(7x3 = 21 Marks)**

- 1 Differentiate performance analysis and performance measurement of algorithms
- 2 List the various methods of representing Sparse matrix
- 3 Define Stack. List the applications of Stack
- 4 Differentiate between linear queue and circular queue
- 5 State the problem with sequential representation. How does linked representation overcome this problem?
- 6 Differentiate between linear probing and Quadratic probing
- 7 Differentiate between full binary tree and complete binary tree
- 8 Define Max heap. Give an example of Max heap
- 9 Write a function to perform insertion sort on an array
- 10 Write the Graph ADT

PART – B**Note: Answer any three questions.****(3x18 = 54 Marks)**

- 11 a) Write and explain the String ADT.
 b) Write a C++ function to perform Polynomial addition by using array representation of Polynomial representation.
- 12 a) Write a C++ program to implement circular queue ADT using arrays.
 b) Consider a circular queue implemented on an array of five elements. Perform the following operations on the circular queue: push(A); push(B); pop(); push(C); push(D); pop(); push(E). Diagrammatically show the contents of the circular queue after each operation.
- 13 a) Explain the different types of Hash functions.
 b) Write the algorithm or function to push and pop an element from the linked stack.
- 14 Define AVL tree. Describe the AVL tree rotations with the help of suitable examples.
- 15 a) Write the algorithm or function for merge sort. Show its tracing on the following array of elements: 19, 17, 25, 78, 94, 34, 67, 12.
 b) Write Kruskal's algorithm to find minimum cost spanning tree of a Graph. Explain it with the help of an example.
- 16 a) Construct a Binary Search Tree from following data inserted in the given order: 10, 2, 33, 5, 16, 13. Perform in-order, pre-order and post-order traversals on the final binary search tree.
 b) Explain the working of List and Table sort.
- 17 Write notes on:
 - a) M-way search trees
 - b) Graph traversal techniques.

FACULTY OF ENGINEERING

B.E. (Inst.) III – Semester (CBCS) (Backlog) Examination, November 2021

Subject: Network Theory

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 Find the inductance of a coil through which flows a current of 0.4A with an energy of 0.45J.
- 2 Name the different types of dependent sources in electric circuits.
- 3 Define time constant of RL series circuit.
- 4 Distinguish between Transient and steady state response.
- 5 A sine wave has a peak value of 30V determine the RMS value and Average value.
- 6 Draw the phasor diagram for series R-L circuit.
- 7 What is phase sequence?
- 8 Define co-efficient of coupling.
- 9 If Z-parameters of circuit are $Z_{11}=40\Omega$, $Z_{22}=50\Omega$, $Z_{12}=Z_{21}=20\Omega$ what would be the values of Y-parameters.
- 10 Define h-parameters of two port Network and write them in a matrix.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 a) State and explain Thevenin's theorem.
- b) For the circuit shown in Figure 1 use superposition theorem to compute current i .

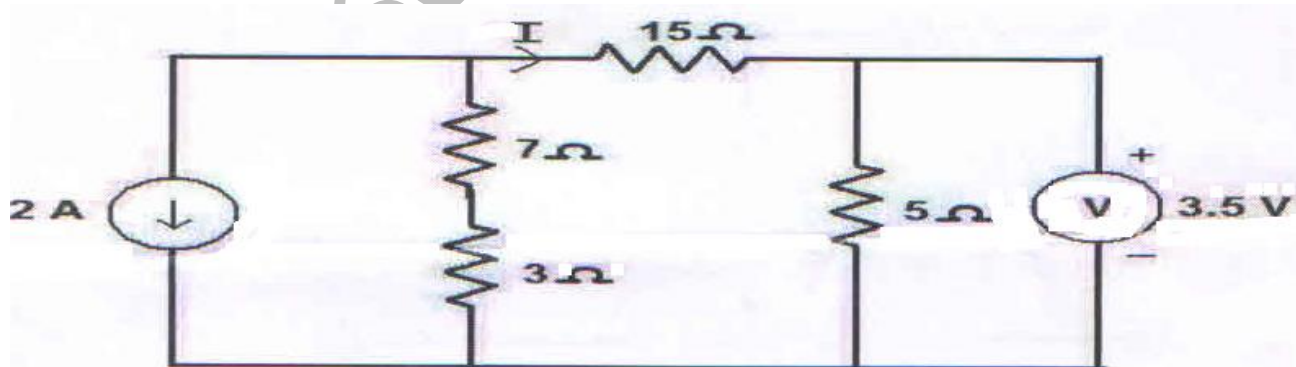


Figure 1

- 12 a) Derive the expression for $i(t)$ in a series R-L circuit which is excited with a DC voltage source V when the switch is closed at $t=0$.
- b) A constant voltage of 100V is applied at $t=0$ to a series RC circuit having $R=5M\Omega$ and $C=20\mu F$ assuming no initial charge to the capacitor find the expression for i , voltage across R and C.
- 13 a) A pure resistance of 50Ω is connected in series with a capacitor of $100\mu F$ across a 230V, 50 Hz supply find the (i) current (ii) power factor (iii) V_R , V_C (iv) Active power, receive power and draw phasor diagram.

..2..

b) A resistance of 10Ω an inductance of 150mH and a capacitor of $100\mu\text{F}$ are connected in parallel across a 50V , 50Hz source. Find the branch currents and total current and draw the phasor diagram.

14 a) Explain about dot convention in coupled circuits.

b) A three phase motor load has a p.f of 0.397 lagging. Two wattmeters connected to measure power show the input as 30Kw . Find the reading on each wattmeter.

15 a) Draw the series connection of 2 two-port network and derive the parameter matrices for the resultant network.

b) Find the z and y parameters for the circuit shown in figure 2.

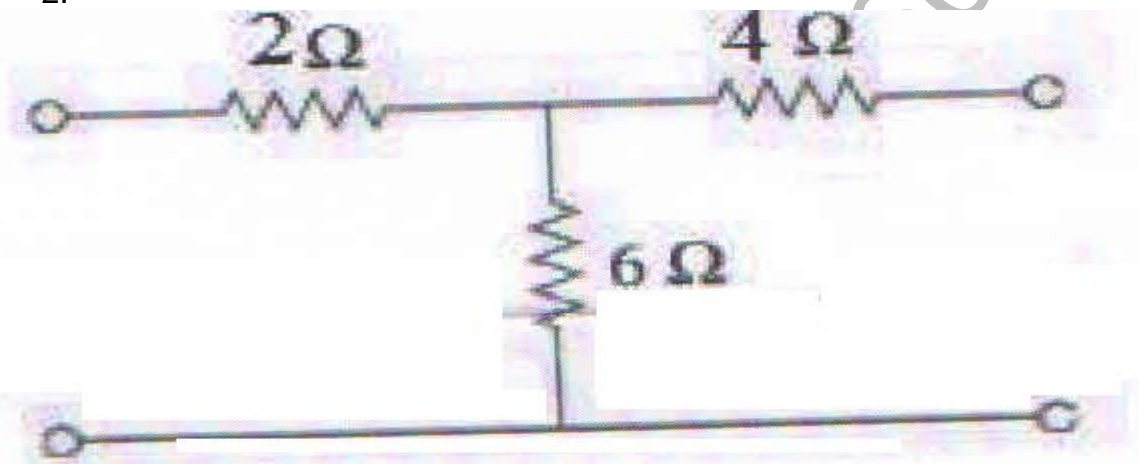


Figure 2

16 a) Determine the equivalent resistance across AB of the circuit shown in the figure 3 below.

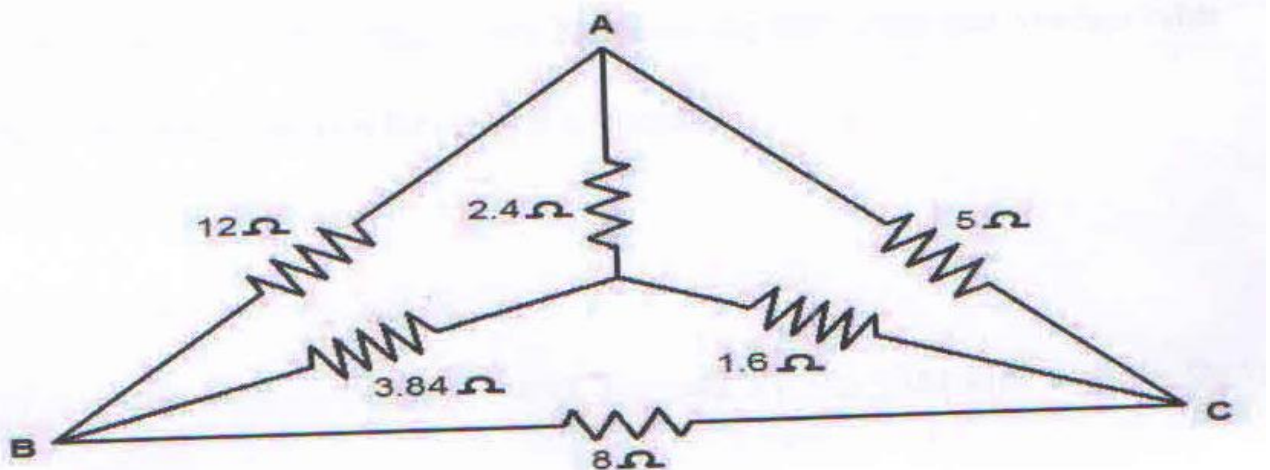


Figure 3

b) Find the Form factor and peak factor of a half-rectified voltage.

17 Write short notes on the following:

- Generation of three phase voltages
- Series Resonance.
