Code No: D-3523/CBCS

FACULTY OF ENGINEERING

BE (Civil) III - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Strength of Materials - I

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. Explain the terms Volumetric strain and Bulk modulus
2. Differentiate between Brittle and Ductile materials
3. Determine the section modulus of a hollow circular section whose internal and external diameters are 80mm and 100mm respectively
4. State the assumptions in theory of simple bending
5. What is the relation between average shear stress and maximum shear stress in rectangular and circular sections?
6. Sketch the core of a circular section of diameter 25mm
7. Differentiate between thin and thick cylindrical shells
8. A point in a strained material is subjected to a direct stress of 80MPa. Calculate the resultant stress on a plane making 30^o with the axis of given stress.
9. Explain the importance of shear center
10. What is shear flow? Explain briefly.

PART – B

Note: **Answer any five questions**. **(5 x 10 = 50 Marks)**

11. A steel rod 20mm diameter passes centrally through a steel tube 30mm internal diameter and 40mm external diameter. The tube is 800mm long and is closed by rigid washers which are fastened by nuts threaded on the rod. The nuts are tightened until the compressive load on the tube is 10kN. Calculate the stresses in the tube and the rod. Take E=200GPa.

12. A circular bar of 24mm diameter and 400mm long is subjected to an axial load of 40kN. The elongation of the bar and change in diameter were found to be 0.165mm and 0.003mm respectively. Determine Poisson's ratio, Young's modulus and shear modulus of the material of the bar.

13. A beam AB, 20 meters long supported on two intermediate props 12 meters apart carries a uniformly distributed load 6kN/m together with concentrated loads of 30kN at the left end A and 50kN at the right end B. The props are so located that the reaction is the same at each support. Determine the position of the props and draw SFD and BMD.

14. A beam of square section is used as a beam with one diagonal horizontal. Find the magnitude and location of maximum shear stress in the beam. Also sketch the shear stress distribution across the section.

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15. At a certain point in a strained material the intensities of normal stresses on two planes at right angles to each other are 20N/mm^2 and 10N/mm^2 both tensile. They are accompanied by shear stress of 10N/mm^2 Find the principal planes and the principal stresses. Find also the maximum shear stress.

16. Find the thickness of metal necessary for steel cylindrical shell of internal diameter 150mm to withstand an internal pressure of 50N/mm^2. The maximum hoop stress in the section is not to exceed 150N/mm^2.

17. Locate the shear center for a channel section whose flange is 100mm x 10mm while the web is 400mm x 10mm. The web is kept vertical.

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Code No: D-3530/CBCS

FACULTY OF ENGINEERING

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

SUBJECT: Electrical Circuits – I

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)**

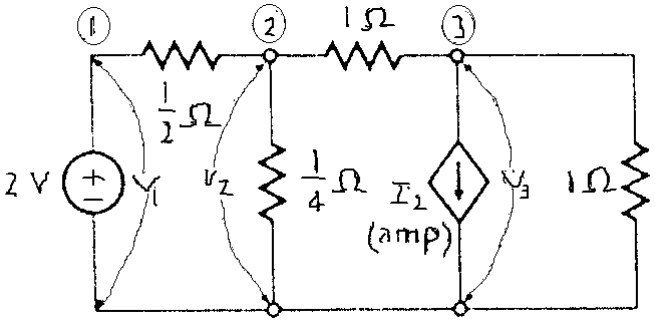
1. Define Impulse and Step signal
2. What is meant by Resonance. Draw the characteristic of impedance w.r.t change in frequency?
3. What are tuned circuit where they are used?
4. Define linear and nonlinear circuits.
5. List active and passive elements.
6. How does capacitor behaves under steady state condition for a DC supply?
7. State Millman's Theorem.
8. State Reciprocity Theorem.
9. Draw the vector diagram for RL series circuit
10. Calculate the complex power for 1KVA load at 0.8 pf lossing?

PART – B

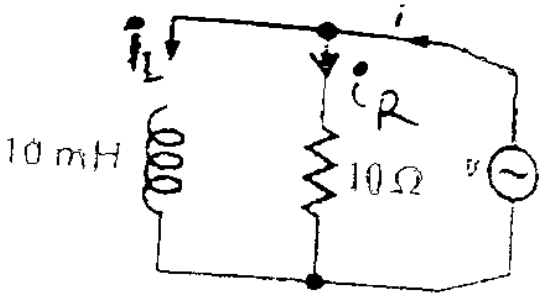
Note: **Answer any five questions**. **(5 x 10 = 50 Marks)**

11. Derive transient response of series RL circuit having DC excitation.

12. In the network shown find V1, V2 & V3 using nodal analysis.



13. Figure represents a parallel RL circuit being energized by a sinusoidal AC voltage of v=100sin (1000t+36º) V. Obtain the instantaneous value of currents through R & L. Hence obtain the total current in terms of RMS values.



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14. A delta connected load has a parallel combination of resistance 5Ω and capacitive reactance – j5Ω in each phase. If a balanced 3 phase 400 Volts supply is applied between lines, find the phase currents and line currents and draw the phasor diagram.

15. State thevenis's and norton's theorem. Explain each with an example.

16. Derive expression for sinusoidal response of series RLC circuit.

17. a) Explain usage of dot convention with an example.
    b) Explain Kirchoff's laws & mention its applications.

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Code No: D-3532/CBCS

FACULTY OF ENGINEERING

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

SUBJECT: Network Theory

Time: 3 Hours **Max. Marks: 70**

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

PART – A

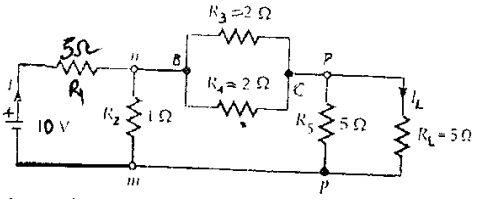
Note: **Answer all questions**. **(10 x 2 = 20 Marks)**

1. Write short notes on exponential excitation.
2. State Maximum power Theorem.
3. Write relationship between line and phase voltages and currents for star connection.
4. Differentiate between transient and steady state response.
5. Define Impulse and Step signal.
6. What is initial condition of L & C?
7. Draw the vector diagram for RLC series circuit
8. Write generalized expression for transmission parameters.
9. Write generalized expression for h parameters.
10. Define Active, Reactive & Apparent power

PART – B

Note: **Answer any five questions**. **(5 x 10 = 50 Marks)**

11. In the circuit shown find I,I_L & voltage drop across R_L.

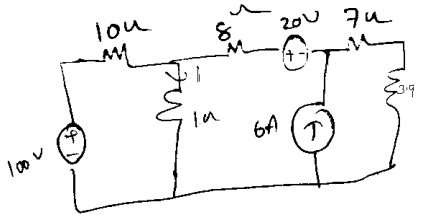


12. Derive expression for sinusoidal response of parallel RL circuit.

13. a) Derive relation between line and phase voltages and currents in delta connection.
    b) List the advantages of 3 phase system over single phase system.

14. Explain Star-Delta transformations.

15. In the figure shown find the current through 1Ω resistor using Thevenin's theorem



16 Explain Series & Parallel resonance in detail.

17. a) Explain Superposition theorem in detail.
    b) Explain the generation of 3 phase voltages.

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Code No. D-3536/CBCS

FACULTY OF ENGINEERING

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

Subject: Signal Analysis and Transform Techniques

Time: 3 Hours **Max. Marks: 70**

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

PART – A

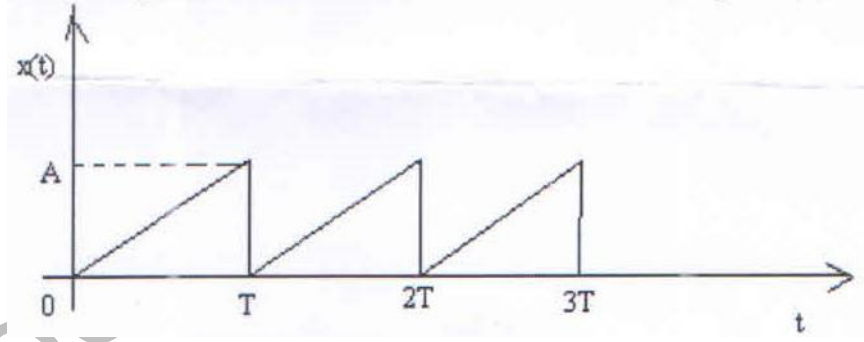
Note: Answer all questions. **(10 x 2 = 20 Marks)**

1 Sketch the signal.
2 Define unit ramp function.
3 State Dirichlet's conditions.
4 Write necessary and sufficient conditions for existence of Laplace transform.
5 Write any two properties of Z transform.
6 Find Z – transform of $x(n) = a^n x(n)$.
7 What are properties of convolution?
8 Define energy spectral density and power spectral density.
9 Given the statement of sampling theorem.
10 Write any two properties of systems.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 Find the trigonometric Fourier series of the following signal x(t)



12 (a) Write any three properties of Laplace transform.
(b) Find the system transfer function of the system described by the following differential equation using Laplace transform. Assume initial conditions are zero.

13 (a) Find inverse Laplace transform of $\left[1/(s+a)^2\right] = X(s)$.
(b) Find Z-transform and ROC of $x(n) = \{1,2,-1,3\}$ sketch the ROC and pole-zero location also.

14 Obtain the convolution of the following using graphical procedure $\underset{1}{x}(n) = \{1.-1,2,0\} : \underset{2}{x}(n) = \{1,2,3\}$

15 (a) Discuss the basic operation on discrete time signals.
(b) State and prove Nyquist sampling theorem.

16 (a) Find which of the following signals are causal or non causal.

(i) $y(n) = e^{|x(n)|}$

(ii) $y(n)2x(n)\tau$.

(b) Find Laplace transform of

(i) $x(t) = e^{-at}\, u(t); t \geq 0$

(ii) $x(t) = e^{-at} \sin wt$

17 (a) Compare Z-transform and Laplace transform.

(b) Write short notes on sampling the Z-transform.

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Code No. D-3540/CBCS

FACULTY OF ENGINEEERING

B.E. (MECH/PROD) III - Semester (CBCS) (Backlog) Examination,
March / April 2022
Subject: Metallurgy and Material Science

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 Distinguish between edge and screw dislocation

2 Explain the phenomenon of strain hardening.

3 Draw the structure of a fatigue fracture surface and explain the fracture zones.

4 Explain cumulative fatigue theory

5 Draw the cooling curve for pure iron and show the different allotropic forms of iron on it.

6 How plain carbon steels are classified?

7 What is full annealing?

8 Differentiate between austempering and martempering

9 Explain practical application of carbonitriding

10 What is the rule of mixtures for composites?

PART – B

Note: **Answer any five questions**. **(5 x 10 = 50 Marks)**

11 a) Distinguish between cold working and hot working processes in detail.
b) Explain the Griffith theory of brittle fracture.

12 a) Explain the experimental determination of fatigue strength with the help of the neat sketch.
b) Discuss low temperature creep and its utility in engineering design.

13 a) Draw Iron-Iron carbide equilibrium diagram and label all points lines and areas of significance.
b) Discuss the invariant reactions in Fe-C system.

14 a) Write procedure for construction of TTT curve and with an example interpret the curve.
b) What is surface hardening? Explain flame hardening process.

15 a) Explain the method of production of steel by Electric Arc Process.
b) Explain in brief the method of production of Aluminium.

16 a) What is critical resolved shear stress? Explain.
b) Write the applications of diffusion theory in mechanical engineering.

17. Write short notes on:
a) Classification of cast iron types
b) Polymerization

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Code No. D-3554/CBCS

FACULTY OF ENGINEERING

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

Subject: Discrete Mathematics

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 What is the value of quotient 'q' and remainder 'r' when?
a = 58^{237} and d = 58^{168} using division algorithm?

2 If p &q are propositions, construct truth table for the Biconditional p$\leftrightarrow$q.

3 Show that $\sqrt{2}$ is not a rational number.

4 Write recursive algorithm for Fibonacci numbers.

5 Find the number of positive integers not exceeding 100 that not divisible by 5 or by 7.

6 Define the terms (i) Complete graph (ii) Cycle graph.

7 State Pigeonhole principle.

8 Fine minterm that equals '1'.
If $x_1 = x_3 = 0$ *and* $x_2 = x_4 = x_5 = 1$ *and* equal '0' otherwise.

9 Define (a) Probability (b) Conditional probability.

10 Draw K – maps for (a) $xy + \bar{x}y$ (b) $x\bar{y} + \bar{x}y$.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 (a) Check for tautology of the following:
$[(p \wedge q) \rightarrow (p \vee q)]$.
(b) Applying Euclids algorithm for find gcd (a,b) and find gcd of the numbers 2406 and 654.

12 (a) Use mathematical induction and show that
$1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2}$ for all positive integers $n \geq$.
(b) If C(n,0), C(n,1), …., C(n,n) denote the Binomial coefficients in the expansion of $(1+x)^n$ Then show that
(i) C(n.0) + C(n,1) +…….+ C(n,n) = 2^n
(ii) C(n,0) + C(n,2) +…….+ C(n,1) + C(n,#) +…..= $2^{(n-1)}$

13 (a) Find a recurrence relation for the number of ways to climb 'n steps if the person climbing the steps can take one step or two steps at a time.
(b) Solve $a_n - 4a_{n-1} + 4a_{n-2} = 3n + 2^n$ *with* $a_0 = 1, a_1 = 1$.

14 (a) Define Hasse diagram. Draw the Hasse diagram representing the partial ordering {(a,b)/a divides b} on {1,2,3,4,6,8,12}.
(b) Describe Prim's algorithm, with an example.

15 (a) Define the terms (a) Tree (b) Directed tree and show that any non-trivial tree has at least one vertex of degree one.

(b) State and prove Euler's formula for connected planar simple graph.

16 (a) State Fermat's theorem and show that $2^{140} \equiv 1 (\text{mod} 11)$.

(b) Define the following:

(i) Contingency

(ii) Logical equivalence

(iii) Existential quantifier.

17 (a) Briefly explain:

(i) In order traversal

(ii) Pre-order traversal

(iii) Post-order traversal.

(b) Show that K_n is planar for $1 \leq n \leq 4$.

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Code No. D-3545/CBCS

FACULTY OF ENGINEERING

B.E. (A.E) III – Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Thermal Engineering

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 and explain First law of thermodynamics.
2. Define PMM-1.
3. State Carnot theorem.
4. Differentiate between Refrigerator and Heat Pump.
5. Define and explain Clausius inequality?
6. Show Brayton Cycle on T-S plot.
7. Write the advantages and disadvantages of Gas turbines over I C engines.
8. Define Volumetric efficiency and Isothermal efficiency of reciprocating air compressor.
9. Show Vapour Compression Refrigeration System on P-H plot.
10. What do you understand by intensive and extensive properties?

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11. 0.1 m^3 of an ideal gas at 300 K and 1 bar is compressed adiabatically to 8 bar. It is then cooled at constant volume and further expanded isothermally so as to reach the condition from where it started. Calculate: (i) Pressure at the end of constant volume cooling. (ii) Change in internal energy during constant volume process. (iii) Net work done and heat transferred during the cycle. Assume c_p = 14.3 kJ/kg K and c_v = 10.2 kJ/kg K.

12. (a) What are limitations of First law of thermodynamics?
    (b) Compare Heat engine, Heat Pump and refrigerator.

13. Explain the concepts of reheating and regeneration employed in gas turbines with the help of neat sketches. Draw T-S diagrams for the same.

14. Explain various processes of Rankine Cycle using T-S plot. In what respect Rankine Cycle different from Carnot Cycle.

15. (a) What are the advantages of Multistage Compression?
    (b) Explain the working of Vapour Absorption Refrigeration System?

16. (a) Explain the types of Hybrid systems.
    (b) What are the advantages of Hybrid Systems?

17. Write short notes on:
    (a) Open and Closed Cycle gas turbines.
    (b) Rankine Cycle.
    (c) Reciprocating Air Compressor.

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Code No. D-3548/CBCS

FACULTY OF ENGINEERING

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

Subject: Discrete Mathematics

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 (p ∪ q) ® (p ∪ q) is a tautology using a series of logical equivalences.
2 What is a tautology? Give an example.
3 Define a partial ordering.
4 When can we say that a function is invertible?
5 Show that the divides relation on the set of positive integers is not an equivalence relation.
6 Define a) Rooted tree b) Complete binary tree.
7 How many edges are there in a graph with 10 vertices of degree six?
8 Define an equivalence binary tree.
9 Define a complete binary tree.
10 Define in degree and out degree of a vertex in a graph.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 a) Show that p ∪ (q ∪ r) and (p ∪ q) ∪ (p ∪ r) are logically equivalent using truth table method.

b) Show that ⊔ (p ∪ (⊔ p ∪ q) and ⊔ p ∪ ⊔ q are logically equivalent by developing a series of logical equivalences.

12 a) State and prove the fundamental theorem of arithmetic.
b) State the pigeon hole principle. Prove the generalized Pigeonhole principle.

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) Find the solution to the recurrence relation $a_n = -3a_{n-1} -3a_{n-2} – a_{n-3}$ with initial conditions $a_0 = 1$, $a_1 = -2$ and $a_2 = -1$.
b) How many anagrams (rearrangements) are there of the word MISSISSIPPI?

15 a) Explain BFS traversal of a graph with an example.
b) Explain Krukal's algorithm to find the minimal spanning tree of a graph with an example.

16 a) Show that a relation R on a set A is reflexive if and only if A^{-1} is reflexive
b) Write the procedure for finding a minimum spaning tree of a graph using Prim's algorithm. Explain with an example.

17 Write notes on any two of the following
a) Graph coloring
b) Partial Ordering and Hasse diagrams
c) Group Homomorphism

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