Code No. 2014

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) I – Semester (Backlog) Examination, December 2019

Subject: Strength of Materials – I

Time: 3 hours **Max. Marks: 75**

Note: Answer all questions in Part – A & answer any five questions from Part – B.

PART – A (25 Marks)

1 Define Bulk Modulus and Shear Modulus. [2]

2 Explain yielding and necking for a ductile material with an aid of a neat sketch. [3]

3 Differentiate between uniformly distributed load and uniformly varying load. [2]

4 Describe the point of contraflexure with an help of a neat sketch. [3]

5 Draw the variation of shear stress across circular section and I-section. [2]

6 List the differences between method of sections and method of joints. [3]

7 Differentiate between thin cylinder and thick cylinder. [3]

8 Write Lame's equations for stresses in a thick cylinder. [2]

9 A steel bar 5 cm by 5 cm in section, 3 m long is subjected to an axial pull of 100 kN. Draw the Mohr's circle of stress and identify the maximum shear stress. [3]

10 State the assumptions of theory of pure torsion. [2]

PART – B (50 Marks)

11 A railway line is laid so that there is no stress in the rails at $25^{o}C$. The rails are 30 m long. Take $\alpha = 11.5 \times 10^{-6}$ per ^{o}C and $E = 2.1 \times 10^{5}$ N/mm^2. Calculate

i. The stress on the rails at $50^{o}C$ if there is no allowance for expansion between two rails
ii. The stress in the rails at $50^{o}C$ if there is expansion allowance of 3 mm per rail
iii. The expansion allowance if the stress in the rails is to be zero when the temperature is $50^{o}C$
iv. The maximum temperature to have no stress in the rails if the expansion allowance is 5 mm per rail [10]

12 A metallic bar 500 mm x 100 mm x 50 mm is subjected to a direct tensile load of 300 kN along the length of the bar. Find the percentage change in the dimensions and in the volume of the bar. What would be the change in the volume of the bar if the metallic bar is subjected to the tensile load of 300 kN in all the three directions of the bar? Take E = 205 kN/mm^2 and Poisson's ratio = 0.25. [10]

13 A simply supported beam of span 6 m is carrying an uniformly distributed load of 2 kN/m throughout the span and a clock-wise couple of 3 kNm at mid-span. Draw the shear force diagram and bending moment diagram for the beam. Hence determine the maximum shear force, maximum bending moment and their locations. Identify the point of contra-flexure if any. [10]

Contd..2

14 A beam of T-section, 200 mm wide and 300 mm deep has 20 mm thick flange and 10 mm thick web. A section of the beam is subjected to a sheer force of 50 kN and bending moment of 100 kNm. Determine the shear stress distribution and bending stress distribution across the section if the web of the beam is kept vertical and flange is on compression side. [10]

15 A steel pipe of 200 mm internal diameter & 4 mm thickness carries water at a pressure of 3 MPa. Determine hoop stress and longitudinal stress in the pipe. Also determine change in length, diameter and volume of the pipe if pipe is 5 m long with closed ends. Take Young's modulus and Poisson's ratio as 200 GPa & 0.30 respectively. [10]

16 At a point in an elastic material under strain, there are normal stresses of 100 N/mm^2 and 50 N/mm^2 (both compressive) respectively at right angles to each other, with positive shearing stress of 25 N/mm^2. Find

i. Resultant stress and its obliquity on a plane making an angle of 45^o with the axis of second stress
ii. Principal stresses and the position of principle planes
iii. Maximum shear stress and its plane
iv. Normal stress on maximum shear plane [10]

17 A solid cylindrical shaft is to transmit 400 kW at 200 rpm. If the shear stress is not to exceed 75 MPa, find its diameter. What percentage saving in weight would be obtained if this shaft is replaced by a hollow one whose internal diameter equals half of the external diameter, the length, the material and maximum shear stress being the same? [10]

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Code No. 2019

FACULTY OF ENGINEERING

B.E. 2/4 (EEE) I – Semester (Backlog) Examination, December 2019

Subject: Principles of Mechanical Engineering

Time: 3 hours **Max. Marks: 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Define (a) Conduction (b) Black body. (3)
2. What are eco friendly refrigerants? (2)
3. Define (a) Brake Power (b) Multi stage compression. (3)
4. Draw the layout of simple gas turbine power plant. (3)
5. What is compound gear train? (3)
6. Differentiate between belt and rope drive. (2)
7. What is Reynolds number? Give its significance. (2)
8. Define specific speed of turbine. Give its significance. (2)
9. What is priming in centrifugal pumps. (2)
10. Draw the indicator diagram showing friction head at suction and discharge. (3)

PART – B (50 Marks)

11. (a) Derive steady flow energy equation. (5)
    (b) Explain working of simple vapour compression refrigeration system. (5)

12. (a) Differentiate between 2-S and 4-S engines. (5)
    (b) Classify Boilers. (5)

13. (a) Derive the expression for the length of the belt in case of cross belt. (5)
    (b) In a flat belt drive the initial tension is 2000N. The coefficient of friction between the belt and the pulley is 0.3 and the angle of lap on the smaller pulley is 150^0. The smaller pulley has a radius of 200mm and rotates at 500 rpm. Find the power in kW transmitted by the belt. (5)

14. (a) What is function of Draft tube. Mention types of draft tubes. (5)
    (b) A double jet Pelton wheel operates under a 40m head and develops 735kw brake power when running at 450 rpm. Make calculations for the flow rate and the diameter of the nozzle jet. Assume overall efficiency η_0 = 0.85 and coefficient of velocity k_v = 0.98 (5)

15. (a) What is manometric head in centrifugal pumps. (5)
    (b) A centrifugal pump is required to deliver 50 litres of water per second to a height of 30m through a 100m long pipe of 15cm diameter. The inlet losses in the suction pipe are estimated to be 0.35m. Assuming an overall efficiency of 70 percent and taking Darcy's friction coefficient 0.015 for the pipeline, determine the power required to drive the pump. (5)

16. (a) What is Darcy's formula. State its significance. (5)
    (b) What is cavitation in pumps? (5)

17. (a) What are industry applications of heat exchangers. (5)
    (b) A single stage, single acting reciprocating compressor is required to compress $0.015m^3$ of air per cycle from 1 bar to 6 bar pressure. Calculate the power required if the compressor runs at 180RPM take compression process as Polytropic n = 1.25. (5)

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Code No: 2021

FACULTY OF ENGINEERING

BE 2/4 (Inst.) I – Semester (Backlog) Examination, December 2019

Subject: Elements of Production Techniques

Time: 3 Hours **Max. Marks: 75**

Note: Answer all questions from Part-A, & Any Five Questions from Part-B.

PART – A (25 Marks)

1	Classify different types of sand castings. Explain.	(3)
2	State the properties of sand mould.	(2)
3	How to select welding process for fabrication.	(3)
4	What do you understand by consumables and non-consumables electrodes?	(2)
5	List out the differences between horizontal and vertical milling machine.	(3)
6	Define cutting speed, feed and depth of cut.	(3)
7	List out merits and demerits of LBM.	(2)
8	What are the applications of ultrasonic machines?	(2)
9	Differentiate between wire drawing and extrusion process.	(3)
10	Define Deep drawing processes.	(2)

PART – B (50 Marks)

11	a) Sketch and explain the solidification process in sand casting.	*(5)*
	b) Write the functions of pattern and explain the desirable properties of a pattern material.	(5)
12	a) Sketch and explain arc welding process.	(5)
	b) Distinguish between brazing and soldering.	(5)
13	a) Explain the working principle of milling process.	(5)
	b) Differentiate between NC, CNC and DNC?	(5)
14	a) Sketch and explain abrasive jet machining.	(5)
	b) List out the advantages, disadvantages and applications of USM.	(5)
15	a) Define rolling. Explain rolling process in detail.	(5)
	b) What are the applications of powder metallurgy?	(5)
16	a) Differentiate between forging and casting.	(5)
	b) What is flux? Why flus is essential in some welding processes.	(5)
17	Write short notes on the following:	(10)
	(a) Resistance welding.	
	(b) Drilling machines	
	(c) Deep drawing	

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Code No. 2027

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) I – Semester (Backlog) Examination, December 2019

Subject: Elements of Mechanical Engineering

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part-A and any five questions from Part-B

PART – A (25 Marks)

1 Define reversibility and irreversibility.
2 Explain the significance of valve timing diagram.
3 Differentiate between a heat engine and a refrigerator.
4 What are the advantages of multi stage compressor?
5 Give the classification of heat exchangers.
6 What are the advantages and limitations of air refrigeration systems?
7 Define forging and rolling process.
8 Explain the principle of arc welding.
9 Define a mechanism and a machine.
10 What are the advantages and applications of epi-cyclic gear trains?

PART – B (5x10 = 50 Marks)

11 a) Derive the Steady Flow Energy Equation.
b) Air is compressed in a reversible process from 10 kPa to 50 kPa. The initial volume and final volumes are 5 m^3 and 1.5 m^3 respectively. Calculate the work done if the compression follows the law PV^n = constant.

12 a) Explain Clausius inequality.
b) A reactor's wall 320mm thick is made up of an inner layer of fire brick (K = 0.84 W/m^0C) covered with insulation layer (K = 0.16 W/m^0C). The reactor operates at a temperature of 1325^0C and the ambient temperature is 25^0C. Determine the thickness of fire brick and insulation layers for minimum heat loss.

13 a) Differentiate among welding, brazing and soldering processes..
b) Explain the principle and working of sand casting process with neat sketch.

14 a) Explain the various types of gear trains with neat sketches.
b) Derive the expression for maximum power transmission for flat belt.

15 a) Derive an expression for LMTD in a counter flow heat exchanger.
b) Explain the principle and applications of die casting process..

16 a) Describe the working of a four stroke Diesel engine.
b) Briefly explain the working of vapour absorption refrigeration system.

17 Write short notes on
a) Turning operation
b) Psychometric processes
c) Critical radious of insulation.

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Code No : 2031

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/AE) I Semester (Backlog) Examination, December 2019

Subject: Managerial Economics Accountancy

Time: 3 Hours **Max. Marks: 75**

Note: Answer All Questions from Part – A, & Any Five Questions From Part – B

PART - A (25 Marks)

1 What is Imprest system?
2 Write the formula of Payback method.
3 Define Bad debt.
4 State the formula of straight line Method of depreciation.
5 Managerial economics is _____economics in nature and _____oriented.
6 Define Opportunity cost principle.
7 Name any two qualitative method of demand Forecasting.
8 _____ is a price maker and _____ is a price taker in a perfectly competitive market.
9 State the formula of Margin of safety.
10 Differentiate between Average cost and Marginal cost.

PART - B (5X10=50)

11. Define Managerial economics and describe its relationship with other sciences.

12. What are the features of perfect competition? How is price determined? Discuss.

13. A company reported the following result for two periods.

Period	Sales (Rs.)	Profit (Rs.)
I	20,00,000	2,00,000
II	25,00,000	3,00,000

Ascertain the BEP, PV ratio, fixed cost and Margin of safety.

14. From the following data, calculate the NPV of both the projects giving recommendation which project should be accepted.

		Project A(Rs.)	Project B (Rs.)
Initial outlay		18,000	20,000
Cash inlfows after tax Year end	1	7,000	8,000
	2	8,000	9,000
	3	6,000	7,000
	4	5,000	6,000

Required rate of return is 10% per annum.

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15. What do you mean by working Capital? List out the sources of working capital.

16. What is meant by the production function? Explain the firm's equilibrium output by using iso-Quants and iso-cost curves.

17. From the following ledger balances from the books of Mr. X on 31st March, 2004, prepare find accounts.

Particulars	**Debit (Rs.)**	**Credit (Rs.)**
Capital	-	75,000
Sales	-	4,20,750
Creditors	-	15,000
Provision for Bad Debts	-	200
Bills Payable	-	2,000
Cash at Bank	12,500	
Cash in Hand	2,000	
Coal and has	1,000	
Opening stock	45,000	
Purchases	2,25,000	
Plant	75,000	
Trade expenses	10,000	
Carriage Inwards	2,500	
Carriage Outwards	1,500	
Factory rent	1,500	
Discounts	350	
Insurance	700	
Debtors	60,000	
Office Rent	3,000	
Printing	600	
General expenses	2,800	
Advertising	15,000	
Bills receivable	6,000	
Drawings	6,000	
Salaries	15,000	
Wages	20,000	
Furniture	7,500	
	5,12,950	**5,12,950**

Adjustments:

1. Prepaid Insurance Rs.100
2. Closing Stock Rs.35,000
3. Write off 10% on Plant.
4. Insurance provision for bad debts to 5%.
5. Outstanding factory Rent Rs.300
6. Outstanding office Rent Rs.600

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Code No. 2038

FACULTY OF ENGINEERING

B.E. 2/4 (CSE) I – Semester (Backlog) Examination, December 2019

Subject: Basic Electronics

Time: 3 hours **Max. Marks: 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. What is Hall coefficient? Where it is used?
2. A HWR having a load resistance of IKΩ & diode forward resistance of 50Ω rectifies an ac voltage of 310V rms. Calculate peak and average values of current.
3. What are the three regions of operation of a transistor?
4. Define pinch-off voltage for a JFET.
5. In a negative feedback amplifier, A = 100, B = 0.02. Find the gain with feedback A_f.
6. What is an Oscillator? How does it differ from an amplifier?
7. Define CMRR of an OP-amp.
8. Give the truth table of full subtractor.
9. A strain gauge has gain factor of 3. If this strain gauge is attached to a metal bar that stretches from 25cm to 25.2cm, calculate ΔR, if its unstrained resistance is 120Ω.
10. Give the symbols for UJT and SCR.

PART – B (50 Marks)

11. (a) Draw and explain energy-band diagrams for (i) an intrinsic (ii) an n-type (iii) a p-type semi conductors. Indicate the positions of the Fermi, the donar and the acceptor levels. [10]
12. (a) Explain why transistor is a current controlled device and JFET is a voltage controlled device. [5]
    (b) Explain transfer characteristics of a JFET. [5]
13. Explain the working of a voltage-series negative feedback amplifier with neat schematic diagram and explain the effect of negative feedback on input and output resistances of this amplifier. [10]
14. (a) Explain the working of op-amp based differentiator with neat circuit diagram. [5]
    (b) Give the design of full-adder circuit using 2-half adders and explain. [5]
15. Explain the working of UJT and explain its characteristics. [10]
16. (a) Explain the V-I characteristics of PN diode. [5]
    (b) Explain Hartley oscillator working. [5]
17. Explain how Bridge rectifier rectifies an input ac waveform with neat diagrams. [10]

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Code No.2043

FACULTY OF ENGINEERING

B.E.2/4 (IT) I – Semester (Backlog) Examination, December 2019

SUBJECT: DATA STRUCTURES

Time: 3 hours **Max Marks: 75**

Note: Answer all questions from Part-A & answer any five questions from Part-B

PART – A (25 Marks)

1. What is an ADT? Explain the String ADT. (3)
2. Define time complexity and space complexity of an algorithm. (2)
3. What are the different binary tree traversal techniques? (3)
4. What is hashing? What are the various techniques for collision handling? (3)
5. Mention the differences between Prim's and Kruskal's algorithms for finding a minimal spanning tree. (2)
6. Construct a Binary Search Tree for the following key.
   values. 50,70,60,20,90,10,40,100 (3)
7. Define maxheap and minheap. (2)
8. Write a recursive function to reverse a linked list. (3)
9. What are the properties of AVL trees? (2)
10. Differentiate subtype and subclass. (2)

PART – B (50 Marks)

11. a) Write an algorithm to add and subtract two polynomials using linked list. (7)
    b) Explain the characteristics of an algorithm. (3)

12. Implement queue using a linked list. Write a C++ program. (10)

13. a) Write a C++ program for implementing Prim's algorithm. (5)
    b) Explain BFS traversal of a graph with an example. (5)

14. Write a C++ function for Selection Sort and trace the algorithm for the following elements. 12,2,45,1,34,56,7,85,23,15 (10)

15. a) Explain the operations on an AVL tree with an example. (6)
    b) Explain hashing with an example. (4)

16. Define a heap. Write algorithm for heap sort. Trace heap sort for the following keys. 5,1,3,8,5,7,6,5,9 (10)

17. Write short notes on the following
    a) Quick Sort (5)
    b) Threaded Binary Tree (5)

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Code No. 2888/AICTE

FACULTY OF ENGINEERING

B. E. (CE)(AICTE) III – Semester (Main) Examination, December 2019

Subject: Engineering Mechanics

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (20 Marks)

1. Define the term free body diagram with and examples.
2. State law of parallelogram of forces.
3. Compare centroid with center of gravity.
4. Find the radius of gyration of a circular section of radius 100mm.
5. Define static and dynamic friction.
6. Mention the different method available for analysis of trusses.
7. A body is rotating with an angular velocity of 3 rad/sec. After 2 seconds the angular velocity of the body becomes 6 rad/sec. Determine the angular acceleration of the body.
8. Differentiate between rectilinear and curvilinear translation.
9. State the principle of impulse momentum.
10. State work energy principle in translation.

PART – B (50 Marks)

11. A flat plate is subjected to a coplanar force system as shown in figure (10. Find the resultant and its x and y intercepts. Each grid in the figure is a square of one unit.

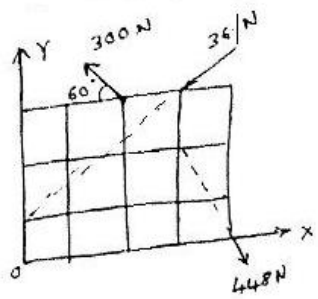

Figure (1)

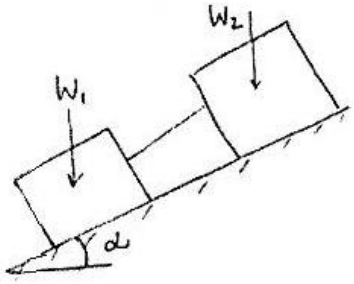

Figure (2)

12. Two blocks of weight W1 and W2 are connected with a string rest on a rough inclined plane as shown in figure (2). If the coefficient of friction are 0.2 and 0.3 for the blocks respectively and W_1 = 75N and W_2 = 80N. Find the values of '' for which sliding will impend.
13. Find the forces in all members of the truss shown in figure (3) using method of joints.

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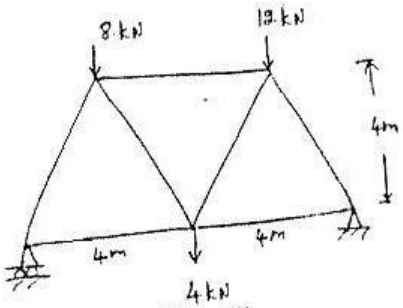

Figure(3)

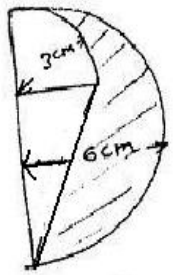

Figure (4)

14. Locate the centroid of the shaded area ash shown in figure (4).
15. Find the moment of inertia of shaded area bout X & Y – axis as shown in figure(5).

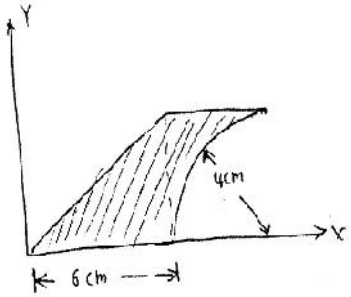

Figure (5)

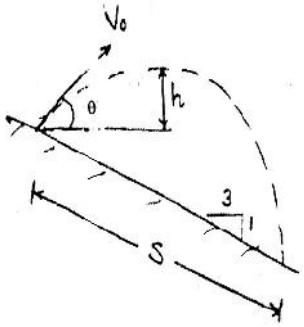

Figure (6)

16. In the figure 6 a ball is thrown down the incline strikes it at a distance of S = 85m. If the ball rises to a maximum height h = 22m above the point of release. Compute its initial velocity and inclination ‘θ’.
17. In what distance will body ‘A’ as shown in figure (7) attain a velocity of 3m/s starting from rest.

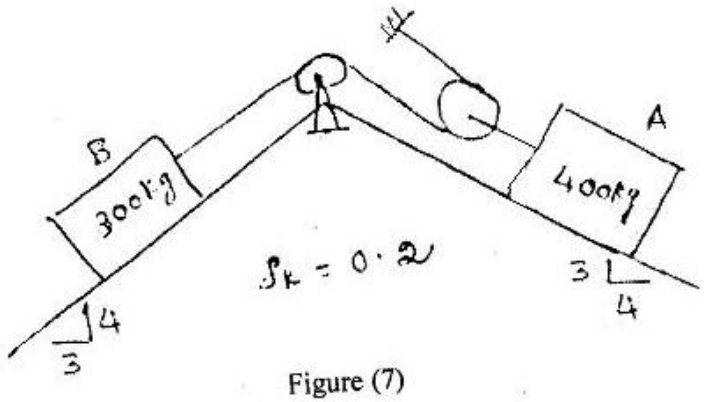

Figure (7)

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Code No. 2901/AICTE

FACULTY OF ENGINEERING

B.E. III - Semester (AICTE)(ECE) (Main) Examination, December 2019

Subject: Elements of Mechanical Engineering

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

Note: Answer all questions from Part - A & any five questions from Part-B.

PART-A (10 X 2 = 20 Marks)

1 Distinguish between S.I and C.I. engine

2 Define Planck's law

3 Define white body and opaque body

4 Explain Newton's law of cooling

5 What do you understand by priming in pumps?

6 Give the classification of reciprocating pump

7 Define gear ratio and velocity ratio

8 Explain interference in gears

9 Draw a neat sketch of spur gear. Write the nomenclature

10 List different parts of Lathe machine

PART-B (5 X 10 = 50 MARKS)

11 a) Explain with neat sketches working of 2 stroke petrol engine (5)
b) Explain the working of brayton cycle. Also derive it's expression of efficiency. (5)

12 a) Derive an expression for overall heat transfer coefficient in $w/m^2\ ^oC$ through a Composite cylinder of three layers (5)
b) Determine the conductivity of a test panel 15cm by 16cm and 1.25cm thick. If during two hour test 8.35 KJ of heat is conducted through the panel against temp. gradient of 35^oc to 25^oc between two faces (5)

13 Explain with a neat sketch the main feature of francis turbine. Also explain its working principal (10)

14 a) Sketch and explain compound gear train and reverted gear train (5)
b) Derive an expression for the length of belt in open belt drive (5)

15 a) Explain the principal of arc welding. Give the list of equipment required for electric arc welding (5)
b) Explain the principals of following machining operations:
(i) Milling (ii) Grinding (5)

16 a) Explain absortivity, reflectivity and transmissivity (5)
b) Derive the expression for ratio of tensions in open belt configuration (5)

17 Write short notes on the following:
a) Classification of heat exchangers (3)
b) Centrifugal pump (4)
c) 3D printing (3)

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Code No.2912/AICTE

FACULTY OF ENGINEERING

B. E. (CSE) (AICTE) III – Semester (Main) Examination, December 2019

Subject: Discrete Mathematics

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (20 Marks)

1. Determine whether $(\sim q \wedge (p -> q)) -> \sim p$ is a tautology?
2. "All lions are fierce", "Some lions do not drink coffee", "Some fierce creatures do not drink coffee". Express the statements using quantifiers p(x), q(x), r(x).
3. Construct a recursive version of a binary search algorithm.
4. Among 100 people how many were born in the same month?
5. How many positive integers not exceeding 1000 are divisible by 7 or 11?
6. What is the solution of the recurrence relation $a_k = a_{k-1}+2a_{k-2}$ with $a_0=2$ and $a_1= 7$.
7. How can the final exams at a university be scheduled so that no student has two exams at the same time?
8. Show that K_n has a Hamilton circuit whenever n>=3.
9. Suppose that a connected planar simpler graph has 20 vertices each of degree 3 into how many regions do a representation of this planar graph split the plane?
10. What is the prefix form for ((x+y)/2) + ((x-4)/3)?

PART – B (50 Marks)

11. (a) If a,b,c are integers such that a/b and a/c then a/(mb+mc) whenever m and n are integers. 5

    (b) What are the solutions of the linear congruence 3x = 4 (mod 7). 5

12. (a) Using mathematical induction, show that n^3-n is divisible by 3 whenever n is a positive integer. 5

    (b) How many ways are there to distribute hands of 5 cards to each of four players from the standard deck of 52 cards? 5

13. Find the solution of recurrence relation $a_n=6a_{n-1}+11a_{n-2}+6a_{n-3}$ with $a_0=2$, $a_1=5$, $a_2=15$. 10

14. Consider the following relations on {1,2,3,4}
    R1 = {(1,2), (1,1), (2,1), (2,2), (3,4), (4,1), (4,4)}
    R2 = {(1,1), (1,2), (1,4), (2,1), (2,2), (3,3), (4,1), (4,4)}
    R3 = {(2,1), (3,1), (3,2), (4,1), (4,2), (4,3)}
    R4 = {(1,1), (1,2), (1,3), (1,4), (2,2), (2,3), (2,4), (3,3), (3,4), (4,4)}
    Which of there relations are equivalence relations? 10

15. Let A={1,2,3}, B={1,2,3,4} the relations R1 = {(1,1), (2,2), (3,3)} and R2 = {1,1), (1,2), (1,3), (1,4)} and obtain (a) RI ∩R2, (b) R1∩R2, (c) R1–R2, (d) R2–R1. 10

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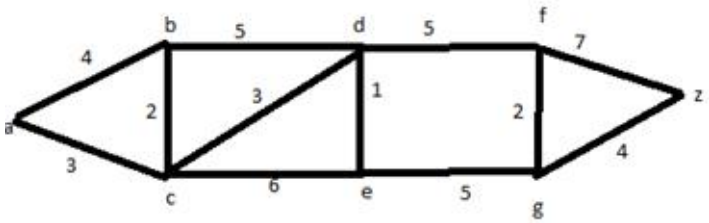
16. Find the shortest path between a and z 10



17. (a) Find sum of products expansion for the function $F(x, \bar{y}, z) = (x + y)z$. 4

(b) Construct circuits that produce the following outputs. 6

(i) $(x + y)\bar{x}$.

(ii) $\bar{x}\overline{(y + \bar{z})}$.

(iii) $(x + y + z)(\bar{x}\,\bar{y}\,\bar{z})$.

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Code No: 2915/AICTE

FACULTY OF ENGINEERING

B.E. III Semester (AICTE) (I.T) Main Examination, December 2019

Subject : Mathematical Foundations of Information Technology

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

Note : Answer all Questions from Part-A & any Five Questions from Part-B

PART – A (20 Marks)

1 Translate the English sentence into logical expression? [2]

"You can access the Internet from campus only if you are a computer science major or you are not a freshman."

2 Determine whether the function $f(x) = x^2$ from the set of integers to a set of integers is one-to-one or not. [2]

3 State product rule. [2]

4 Solve the recurrence relation $a_n = 3a_{n-1}+2$; $a_0 = 1$ [2]

5 Differentiate between spanning tree and minimum spanning tree. [2]

6 Write the truth table for implication P->Q [2]

7 Write the converse, Inverse and contra positive of the following conditional statement: [2]

"**The home team wins whenever it is raining**"

8 Define partial ordering and a POSET. [2]

9 How many different ways are there to select 5 players from a 10-member tennis team? [2]

10 Define the terms

i) Euler path

ii) Graph coloring [2]

PART – B (50 Marks)

11 a) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology. [5]

b) Show that $(p \rightarrow q)$ and $(\sim p \vee q)$ are logically equivalent. [5]

12.a) Draw the Hasse diagram of the set D_{30} which denotes the set of all positive divisors of 30 (i.e.,D_{30} ={1,2,3,5,6,10,15,30}) [5]

b) Define composition of two functions. If f: R -> R and g : R -> R are two functions defined as $f(x) = 3x + 4$ and $g(x) = x^2 + 1$.Then find $(f \circ g)(x)$ and $(g \circ f)(x)$. [5]

13.a) If n is a positive integer, then prove that $\sum_{k=0 \text{ to } \infty} C(n,k) = 2^n$ [5]

b) What is the coefficient of x^3y^7 in the binomial expansion of $(2x-9y)^{10}$. [5]

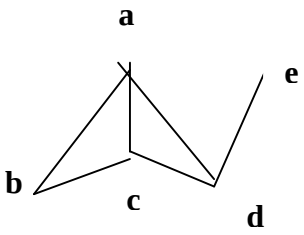
14.a) What is the solution of recurrence relation $a_n=6a_{n-1} - 9a_{n-2}$ with initial conditions $a_0 = 1$ and $a_1 = 6$? [5]

b) Find the recurrence relation for the number of ways to climb 'n' steps if the person climbing the steps can take one step or 2 steps at a time. [5]

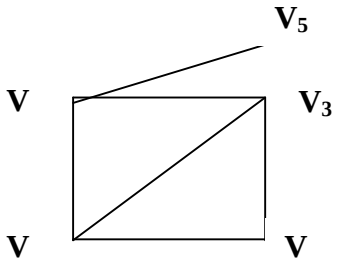
……2

15.a) Explain Kruskal's algorithm to find a minimum cost spanning tree with an example. [5]

b) Define the term 'Isomorphic graphs' and show that the graphs G and G' given below are isomorphic. [5]



Graph G



Graph G'

16. a) Using truth table, Show that p ν (q ∧ r) and ((p ν q) ∧ (q ν r)) are logically equivalent. [5]

b) Define Universal Quantifier. [5]

17. a) There are 345 students at a college who have taken a course in calculus, 212 who have taken a course in mathematics and 188 who have taken courses in both calculus and mathematics. How many students have taken a course in either calculus or mathematics? [5]

b) Define Equivalence relation. Give example. [5]

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Code No. 2523 / CBCS

FACULTY OF ENGINEERING

B.E. (Civil) III – Semester (CBCS) (Backlog) Examination, December 2019

Subject: Strength of Materials – I

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

Note: Answer all questions from Part-A and any five questions from Part-B
Assume any data missing suitably.

PART – A (10x2 = 20 Marks)

1 State middle third rule for a column section.
2 Write Lami's equations for a thick cylinder and explain the parameters.
3 Explain unsymmetrical bending in beams.
4 What is Ellipse of stress?
5 Define shear centre and shear flow.
6 A uniform circular bar 2m long and 80mm in diameter is subjected to an axial load of 90 KN. Calculate the elongation of bar. Take, E=200 KN/mm^2.
7 The Young's modulus and Poisson's ratio for a material are 200 GPa and 0.32 respectively. Calculate its Bulk modulus.
8 Draw bending moment diagram for a cantilever beam of span 4m subjected to a clockwise couple of 5 kN-m at its free end.
9 Calculate the section modulus of a circular section of 80mm diameter.
10 Calculate the maximum shear stress for a square section of side 60mm when subjected to a shear force of 90 kN.

PART – B (5x10 = 50 Marks)

11 A copper rod of 22mm diameter passes through a steel tube of 30mm external diameter and 24mm internal diameter. The rod and tube are screwed together at ends at a temperature of 60^{o}C. Calculate the stressers in rod and tube if the temperature of the assembly is traised to 160^{o}C, given E_s=200 GN/m^2, E_c=100 GN/m^2, $\sim_s$ = 12x10^{-6} / ^{o}C and $\sim_c$ = 18x10^{-6} / ^{o}C.

12 A simply supported beam 10m long is subjected to a uniformly distributed load of 10 kN/m over a length of 6m from left support and a point load of 80 kN acting at 2m from right support. Draw shear force and bending moment diagrams.

13 A beam of rectangular section 200 mm wide and 360 mm deep is subjected to a bending moment of 40 kN-m and a shear force of 80 kN across a section. Calculate the maximum bending stress and maximum shear stress. Also, sketch the bending stress and shear stress distribution diagram.

14 A hollow circular column of 120 mm external diameter and 90 mm internal diameter is subjected to an axial load of 100 kN and an eccentric load of 90 kN at an eccentricity of 80 mm from the axis of column. Calculate the maximum and minimum stress intensities at the base of column section.

..2

15 A thin cylinder of 800 mm internal diameter and 1.2m long is subjected to an internal pressure of 6 N/mm^2. If the permissible tensile stress in cylinder is 160 N/mm^2, calculate the increase in volume of cylinder. E=200 kN/mm^2 and v=0.3.

16 a) A point in a strained material is subjected to Principal stresses of 150 N/mm^2 (tensile) and 90 N/mm^2 (comp). Calculate normal and tangential stress on a plane making an angle of 30^o with the axis of compressive stress. Also, find the maximum shear stress.

b) Find the external diameter of a thick cylinder of internal diameter 120 mm to withstand a pressure of 40 N/mm^2, if the permissible stress if 130 N/mm^2.

17 A cantilever beam 3m long is subjected to point load of 800N at its free and inclined at 30^o with vertical as shown in Figure below. Calculate the stresses at all four corners.

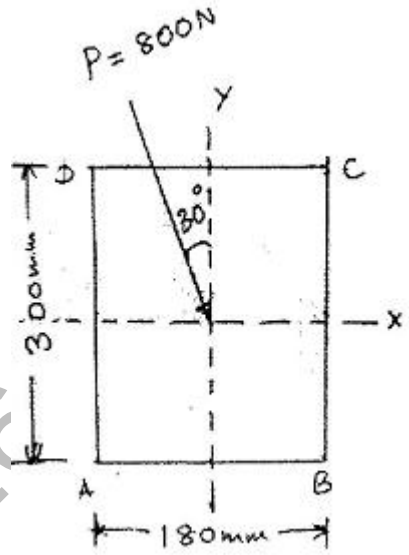

Fig.

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Code No. 2530/CBCS

FACULTY OF ENGINEERING

BE III-Semester (CBCS)(EEE)(Backlog)Examination, December 2019

Subject: Electrical Circuits – I

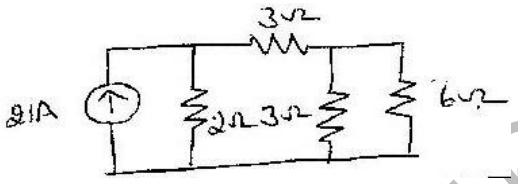
Time: 3 Hour **Max. Marks: 70**

Note: Answer All Questions From Part- A, & Any Five Questions From Part – B.

PART – A (20 Marks)

1) Distinguish between independent source and a dependent source. (2)

2) Determine the current through 6Ω resistor and power supplied by the current Source (2)



3) Discuss Energy stored in inductance. (2)

4) Distinguish between Series and parallel circuits. (2)

5) State Thevinin's theorem. (2)

6) Differentiate between self and mutual inductance (2)

7) Discuss response of RL circuit. (2)

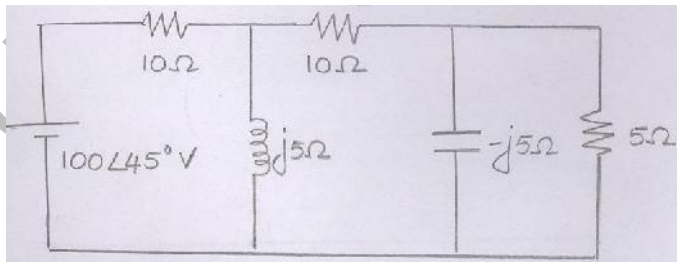
8) Explain the concept of Duality in electrical networks. (2)

9) Compute the form factor and peak factor of a halfwave rectified sinusoidal waveform (2)

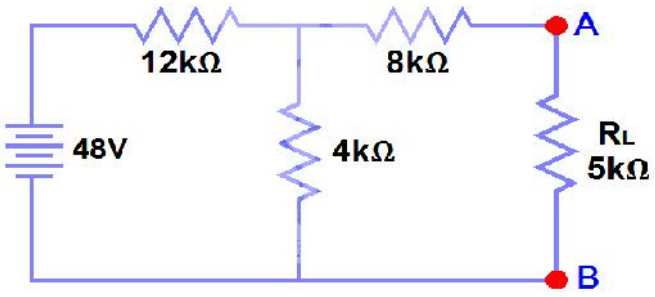
10) What is the true power in an AC circuit? (2)

Part – B (50 Marks)

11. Find the power dissipated in the 5 resistor shown in the figure below using mesh Analysis. (10)



12. Find V_{TH}, R_{TH} and the load current flowing through and load voltage across the load resistor in fig below by using Thevenin's Theorem. (10)



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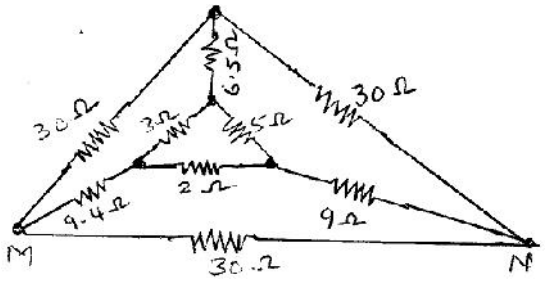
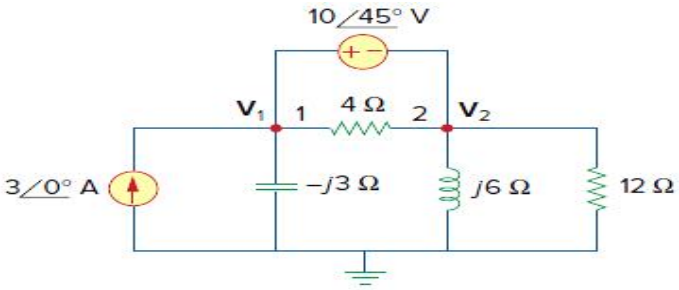
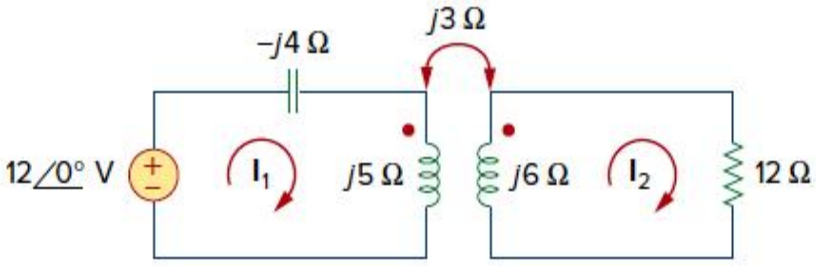
13. Find resistance between point M&N in the figure below (10)



14) Compute V_1 and V_2 in the circuit of Fig. (10)



15) Calculate the phasor currents I_1 and I_2 in the circuit of Fig. (10)



16) A balanced Y-connected load with a phase impedance of 40 + j25 Ω is supplied by a balanced, positive sequence Δ-connected source with a line voltage of 210 V. (10)

Calculate the phase currents. Use V_{ab} as a reference

17) Discuss

a) Analysis of circuits with mutual inductance (5)

b) Resonance of Series circuits (5)

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Code No: 2532/CBCS

FACULTY OF ENGINEERING

B.E.III- Semester (Inst.) (CBCS) (Backlog) Examinations, December 2019

Subject : Network Theory

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

Note: Answer all questions of Part-A, & Answer any FIVE Questions from Part-B

PART-A (20 Marks)

1 What are the dependent and independent sources? [2]

2 What is the condition for maximum power to be absorbed by the load? [2]

3 Write the integro - differential equations for the network elements R, L and C [2]

4 What do you mean by transient response and steady state response? [2]

5 Prove the average value for sinusoidal quantity is equal to 0.637 times the maximum value [2]

6 Define active and reactive powers and write their equations [2]

7 Define and derive the resonant frequency of series resonant circuit [2]

8 Obtain the relationship between line emf and phase emf of 3- phase star connected network [2]

9 Define Y-Parameters of two port network and write them in a matrix form [2]

10 Which parameters can be obtained, when two numbers of two port networks are connected in parallel? Write the complete equations of such connection [2]

PART-B (50 Marks)

11 (a) State and prove the maximum power transfer theorem with DC excited network [4]

(b) Find the current in 100 Ohms resistor of fig-1 using nodal analysis [6]

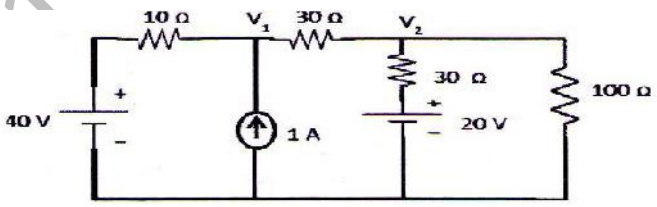


Figure-1

12 (a) Draw the time response of an inductor current in a series RL circuit excited by DC supply [4]

(b) Derive the expression for the current in a series RL circuit (R = 10Ω, L = 10 mH) excited by a Sinusoidal voltage of 100V, 50 Hz if the supply is connected at t = 0. Assume zero initial Conditions [6]

13 (a) Define and prove average and RMS values of sinusoidal varying current and voltage [4]

(b) A resistance of 10 Ω is connected in series with an inductance of 100mH and a capacitance of 150 µF across an A C single phase supply of 200 V, 50 Hz. Find. (1) Supply current (2) Power Factor (3) Phase angle (4) Active Power, Reactive Power and Apparent Power (5) Draw the Complete Vector diagram. [6]

...2

14 (a) Obtain the relationship of Z-Parameters in terms of Y-Parameters [5]

(b) Determine the *h* parameters for the circuit shown in figure-2 below [5]

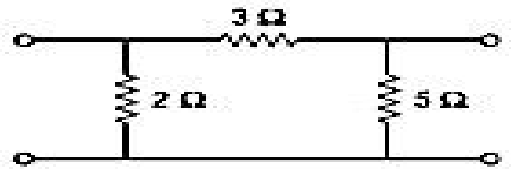


Figure-2

15 (a) Show that resonant frequency is the geometrical mean of two half power frequencies or prove that $\omega_0 = \sqrt{\omega_1 \omega_2}$ [5]

(b) A balanced star-connected load absorbs a total power of 5 KW at a leading power factor of 0.6 when connected to a line voltage of 240 V. Find the impedance of each phase and the total complex power of the load. [5]

16 (a) Derive the equations to convert Delta network into its equivalent star network [5]

(b)Find the equivalent resistance between A & B in the given network of fig-3 [5]

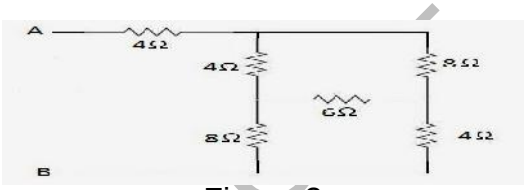
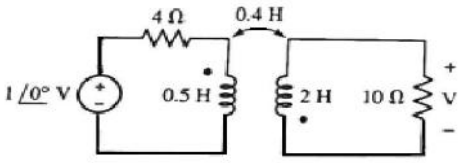


Figure-3

17 (a) Derive an expression for co-efficient of coupling (K) [4]

(b) Find V in the circuit of fig-4 [6]



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Code No. 2536 / CBCS

FACULTY OF ENGINEERING

B.E. (ECE) III – Semester (CBCS) (Backlog) Examination, December 2019

Subject: Signal Analysis and Transform Techniques

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

Note: Answer all questions from Part-A and any five questions from Part-B

PART – A (10x2 = 20 Marks)

1 Sketch the following signals:

a) r (-t) b) 2 r(t) – 2 r(t-2), r(t) represents a ramp signal

2 Show that the power of a periodic signal is P = $\sum_{n=-\infty}^{\infty} |Cn|^2$ where C_n is the complex exponential Fourier co-efficient of the signal.

3 Find the Fourier transform of the signal x(t) = $te^{-2t}u(t)$ by applying frequency domain differentiation property.

4 Write the statements of initial value theorem and final value theorem of Laplace transforms.

5 Write any two properties of Region of Convergence, ROC for Z-transforms of discrete time signals.

6 Find x(n) if x(z) = if X(z) = $\frac{5z}{(z-2)(z-3)}$ $|z| > 3$.

7 Prove: x(n) $\otimes$ ¢ (n-1) x [n-1]

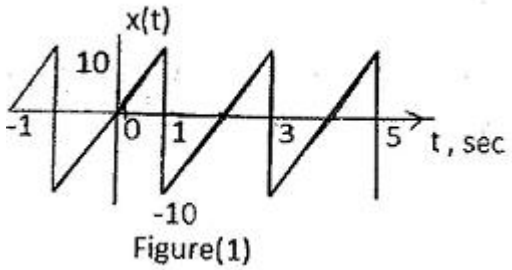
8 Find y(t) = u(t) $\otimes$ [¢ (t-2) - ¢ (t-5)]

9 Define a discrete energy signal. Give an example.

10 Write any two properties of the Fourier co-efficients of discrete Fourier series.

PART – B (5x10 = 50 Marks)

11 Find the complex exponential Fourier series of the periodic signal shown in figure (1). 10



Figure(1)

12 a) Test whether the signal x(t) = 20 Sin (150 ®t) + 150 Cos (450 ®t) is periodic or aperiodic. If periodic find the fundamental time period of the signal. 5

b) Find the total energy of the signal x(t) shown in figure (2). 5

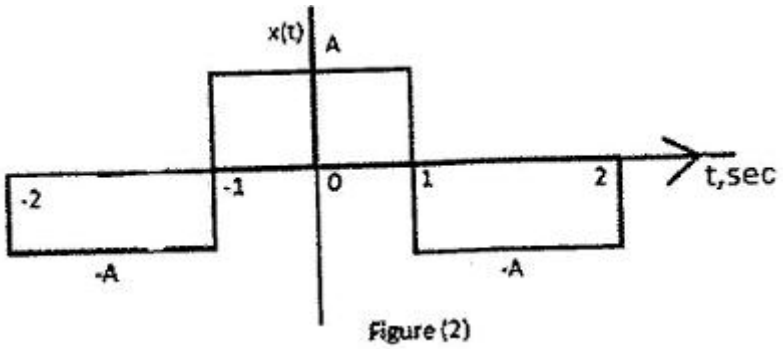


Figure (2)

13 a) Find the Fourier transform of the signal shown in figure (3). 5

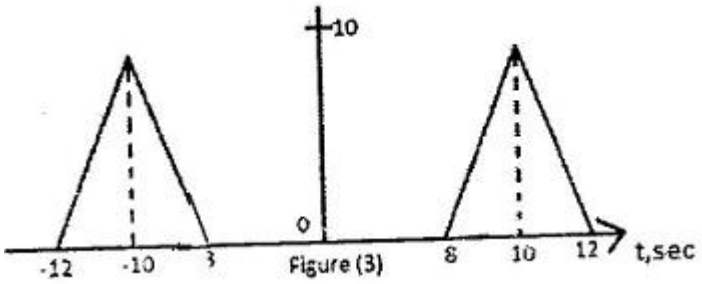


Figure (3)

b) Determine the signal x(t), if $X(s) = \frac{1}{s(s+2)^2}$ Re(s) > -2. 5

14 a) A causal discrete time system is characterized by the difference equation y(n) -2 y(n-1) = 3 x(n). Find the impulse response and transfer function H(z) of the system. 5

b) Using the power series expansion technique finde the inverse Z-transform of $X(z) = \frac{z}{2z^2 - 3z + 1}$ |z| > 1. 5

15 a) Find the convolution of the two time signals $x_1(t) = e^{-2t}$ u(t) and $x_2(t)$ = r(t). 5

b) Find the auto-correlation of the signal x(t) = e^{-5t} u(t). 5

16 a) Define Linear discrete system, Memory less discrete system, Time invariant Discrete System, Causal district time system. 6

b) Write any four properties of the co-efficients of Discrete Fourier series. 4

17 Write short notes on the following:

a) Orthogonality of signals 3

b) Properties of auto-correlation of continuous time energy signals. 3

c) Stability of continuous time systems and discrete time systems. 4

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Code No. 2540/ CBCS

FACULTY OF ENGINEERING

B.E III Semester (CBCS) (M/P)(Backlog) Examination, December 2019

Subject: Metallurgy and Material Testing

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

Note: Answer all questions from Part A and any five questions from Part -B

PART – A (20 Marks)

1 Explain Frankel and Schottky imperfections.
2 What is strain hardening?
3 Differentiate between creep curve and stress rupture curve.
4 What are the metallurgical variables effecting the fatigue of metals.
5 What is eutectoid reaction in Non Ferrous metals?
6 What is the effect of carbon on the properties of steel?
7 Define tempering. What are main aims of tempering?
8 Distinguish between induction Hardening and Flame hardening.
9 What are the different zones in cupola?
10 State the properties and applications of Muntz metal.

PART – B (50 Marks)

11 a) Describe various stages of annealing of cold worked metal.
b) Discuss slip and twining as mechanism of permanent deformation.

12 a) Explain the experimental determination of fatigue strength with the help of the neat sketch.
b) Explain the industrial applications of diffusion in mechanical engineering.

13 a) Define the following structures: i. Ferrite ii. Austenite iii. Cementite iv. Pearlite.
b) Draw a neat sketch of $Fe–Fe_3C$ diagram. Label all important points, lines and phases in it.

14 a) Discuss Normalizing as heat treatment process and mention the applications.
b) Differentiate between austempering and martempering.

15 a) Explain the production of steel using Bessemer converter.
b) Discuss any one method of production of Aluminium.

16 a) What is fracture? Explain the characteristics of ductile and brittle fracture
b) Draw the cooling curves for
i.) Solid solution and
ii) Eutectoid alloy systems.

17 Write short notes on
a) Cumulative Fatigue
b) Full Annealing
c) Maraging steels

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Code No: 2745/CBCS

FACULTY OF ENGINEERING

B.E. III Semester (AE)(CBCS) (Backlog) Examination, Dec. 2019

Subject: Thermal Engineering

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

Note: Answer all questions from Part A & any five questions from Part B

PART – A (10 x 2 = 20 Marks)

1 Define thermodynamic system. State types of systems.
2 Define Zeroth law of thermodynamics and state its significance.
3 Define Clausius statement of second law of thermodynamics.
4 Differentiate between heat pump and refrigerator.
5 Define and classify gas turbines.
6 Differentiate between nozzle and diffuser.
7 Sketch P-V and T-S diagram for Rankine cycle.
8 Define COP of refrigeration system.
9 What are hybrid vehicles?
10 Define Isothermal efficiency of compressor.

.PART – B (5 x 10 = 50 Marks)

11 (a) Derive steady flow energy equation. 5M
(b) A system contains 0.15 m^3 of a gas at a pressure of 3.8 bars and 150^oC. It is expanded adiabatically till the pressure falls to 1 bar. The gas is then heated at constant pressure till its enthalpy increases by 70kJ. Determine the total work done. Take C_p = 1 kJ/kg K and C_v = 0.714 kJ/kg K. 5M

12. (a) Explain Carnot cycle with the help of T-S and P-V diagram. Also derive its efficiency. 5M
(b) A Cold storage is to be maintained at -5^oC while the surroundings are at 35^oC. The heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual COP of the refrigeration plant is one third of an ideal plant working between the same temperatures. Find the power required to drive the plant. 5M

13. In an oil gas turbine installation, air is taken at 1 bar and 30 ^oC. The air is compressed to 4 bars and then heated by burning the oil to temperature of 500^oC, if the air flows at Rate of 90 kg/minute find the power developed by the plant. Take for air as 1.4 and Cp as 1 kJ/kgK. If 2.4 kg of oil having a calorific value of 40,000 kJ/kg is burnt in Combustion Chamber per minute, find the overall efficiency of plant. 10M

14. (a) Explain the working of simple vapour compression refrigeration system. 5M
(b) Dry saturated steam at 10 bars is supplied to a prime mover and the exhaust takes place at 0.2 bar. Determine the Rankine efficiency, Efficiency Ratio and Specific steam consumption of the prime mover, if the indicated thermal efficiency is 20%. Also find the percentage change in Rankine Efficiency. If the steam is initially 90% dry. 5M

15. (a) Explain the working principle of Fuel Cell. 5M
(b) Discuss the effect of clearance volume on work done of reciprocating air compressor.

16. (a) Explain how regeneration improves performance of Gas Turbines. 5M
(b) Discuss future developments and prospects of Hybrid Vehicle. 5M

17. (a) Define (i) Pure Substance (ii) Reheating in turbines. 5M
(b) Define Intensive and Extensive properties. 5M

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Code No.2548/CBCS

FACULTY OF ENGINEERING

B. E. (CSE) (CBCS) III – Semester (Backlog) Examination, December 2019

Subject: Discrete Mathematics

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (20 Marks)

1. Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology using a series of logical equivalences?
2. What is the power set of the set {0, 1, 2}?
3. Define a partial ordering.
4. State the sum rule and product rule.
5. Show that the divides relation on the set of positive integers is not an equivalence relation.
6. Define (a) Pendant vertex (b) Hamilton Cycle.
7. How many edges are there in a graph with 10 vertices of degree six?
8. Define abelian group.
9. Define a complete binary tree.
10. What is a derangement?

PART – B (50 Marks)

11. (a) Construct truth table of the formula $P \rightarrow Q \rightarrow R \rightarrow S$. (5)

    (b) Check whether the following argument is correct: Every mango is either an apple or an orange. Every pineapple is a mango. No apples are pineapples. Every object is either an apple or pineapple or a mango or an orange. Therefore, if an apple is a pineapple, then it is an orange. Use predicates M(x): x is a mango, A(x): x is an apple, P(x): x is a pineapple, O(x): x is an orange. (5)

12. (a) State and prove the fundamental theorem of arithmetic. (5)

    (b) State the pigeon hole principle. Prove the Generalized Pigeonhole principle. (5)

13. (a) Let f be the function from Z to Z such that $f(x) = x^2$. Is f invertible? (6)

    (b) Let $f(x) = x+2$ and $g(x) = 2x+1$, find $(fog)(x)$ and $(gof)(x)$. (4)

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 $a_2 = -1$. (6)

    (b) How many anagrams (rearrangements) are there of the word MISSISSIPPI? (4)

15. (a) How are paths used in determining the isomorphism of graphs? Explain with an example. (5)

    (b) Explain the procedure for constructing Euler Circuits. (5)

16. (a) Show that a relation R on a set A is reflexive if and only if A^{-1} is reflexive. (4)

    (b) Write the procedure for finding a minimum spanning tree of a graph using Prim's algorithm. Explain with an example. (6)

17. Write short notes on any two of the following: (5+5)
    (a) Group homomorphism and isomorphism.
    (b) Graph Coloring.
    (c) Bipartite graphs and planar graphs.

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Code No. 2554 / CBCS

FACULTY OF ENGINEERING

B.E. (IT) III-Semester (CBCS) (Backlog) Examination, December 2019

Subject : Discrete Mathematics

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (20 Marks)

1 Show that $(p \to q) \wedge (p \to r) \equiv p \to (q \wedge r)$. 2

2 Let *f* : Z → Z and g : Z → Z, defined as f(x) 2x + 3 and g(x) 3x + 2, then compute *f* o g and g o *f*. 2

3 How many bit strings of length ten both begin and end with a 1? 2

4 Let a, b, c be integers, where a ≠0, then prove that if a | b and a | c then a | (b+c). 2

5 How many different strings can be made by reordering the letters of the word ABRACADABRA? 2

6 What is the probability that the sum of the numbers on two dice is even when they are rolled? 2

7 Show that the "greater than or equal" relation (≥) is partial ordering on the set of integers. 2

8 Define a bipartite graph: give an example of such a graph. 2

9 State the theorem for principle of Inclusion-Exclusion. 2

10 Find a solution for recurrence relation : $a_n = a_{n-1} - n$, $a_0 = 4$. 2

PART – B (50 Marks)

11 a) Let L(x, y) be the statement "x loves y", where the domain for both x and y consists of all people in the world. Use quantifiers to express each of these statements. 6

i) Everybody loves Jerry
ii) Everybody loves somebody
iii) There is somebody whom everybody loves
iv) Nobody loves everybody
v) There is somebody whom Lydia does not love
vi) There is somebody whom no one loves

b) Prove using set builder notation that $\overline{A \cap B} = \overline{A} \cup \overline{B}$. 4

12 a) Use the Chinese remainder theorem to find all solutions to the system of congruences x ≡ 2 (mod 3), x ≡ 1 (mod 4), and x ≡ 3 (mod 5). 6

b) Give a big-O estimate for f(x) = (x+1) log(x^2 + 1) + 3x^2. 4

..2

13 a) Prove that $3+3 \cdot 5+3 \cdot 5^2 + \ldots\ldots\ldots\ldots +3 \cdot 5^n = 3(5^{n+1} - 1)/4$, whenever n is a nonnegative integer. 6

b) A drawer contains a dozen brown socks and a dozen black socks, all unmatched. A man taken socks out at random in the dark. 4

i) How many socks must he take out to be sure that he has at least two socks of the same color?

ii) How many socks must he take out to be sure that he has at least two black socks?

14 a) Find the solution to recurrence relation : $a_n = 6a_{n-1} - 11a_{n-2} - 6a_{n-3}$ with initial conditions : $a_0 = 2$, $a_1 = 5$, $a_2 = 15$. 5

b) Find the number of solutions of $e_1 + e_2 + e_3 = 17$, where e_1, e_2 and e_3 are nonnegative integers with $2 \le e1 \le 5$, $3 \le e2 \le 6$, and $4 \le e3 \le 7$ 5

15 a) Draw the Hasse diagram representing the partial ordering {(a, b) | a divides b} on {1, 2, 3, 4, 6, 8, 12}, and find maximal, minimal, greatest, least elements (if any). 6

b) Are the graphs given in figure 1 Isomorphic, exhibit an isomorphism or provide a rigorous argument for non-existence of Isomorphism? 4

Figure 1: Graph G_1 and G_2

16 a) Define Preorder, and Postorder traversals in a tree. Perform the preorder and Postorder traversals in following tree in figure 2 given overleaf. 6

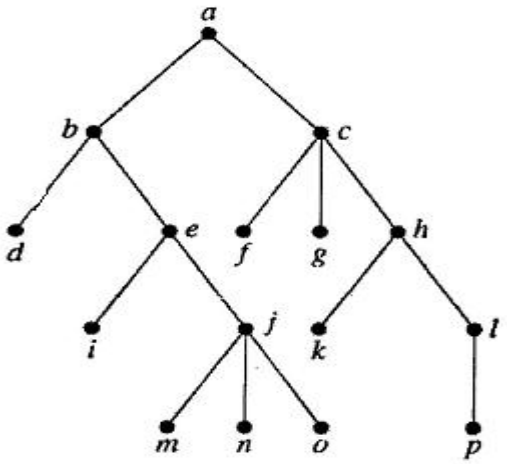

Figure 2: an m-ary tree with m=3

b) If G is a connected planar simple graph with e edges and v vertices, where $v \ge 3$, then $e \le 3v-6$. 4

..3

17 a) Define a Minimum spanning Tree (MST)? Write Kruskal's algorithm to find an MST. Obtain an MST for the graph shown in figure 3 using Kruskal's algorithm. 6

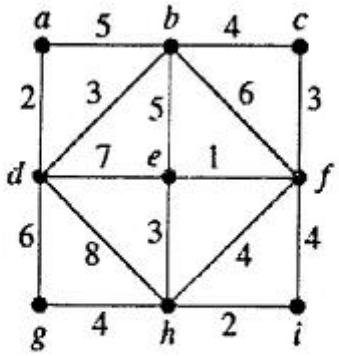

Figure 3: Weighted connected graph

b) Build a binary search tree for the words oenology, phrenology, campanology, ornithology, ichthyology, limnology, alchemy, and astrology using alphabetical order. 4

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