Code No. 11001/BL

FACULTY OF ENGINEERING

B.E I-Year (Backlog) Examination, May/June 2019

Subject : English

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

Note: Answer all questions from part – A & any Five questions from Part – B

Part – A (25 MARKS)

I. Fill in the blanks with suitable Prepositions (1/2x4=2)

1) John is someone who believes _____ saying what he thinks.
2) The local government is responsible _____ keeping the streets clean.
3)The gas explosion caused a lot of damage _____ surrounding houses.
4)What are you doing _____ Sunday?

II. Rewrite the following sentences after making necessary corrections if any. (1/2x6=3)

1) He walks carefully lest he falls.
2) Either Sudhir or his friends has done this work .
3) You should not make noise.
4) We eat fruits daily
5) Ram told me that he went out for morning walk everyday.
6) He is doing a four-years course in engineering.

III. Rewrite the following sentences with appropriate question tags (1/2x6=3)

1) There is little hope of his recovery,
2) We all need money,
3) Jane is very brave,
4) We could hardly concentrate,
5) Few students turned up for the class,
6) Jack looks ill

IV. Rewrite the following sentences in Reported speech (1x3=3)

1)The teacher said, "God is everywhere"
2)"You have come first in the class", my friend told me.
3)"Who is there?"she spoke in a surprised voice.

V. Choose the appropriate SYNONYM for the underlinedword in each sentence from the options given below: (1/2x6=3)

1) The <u>bounties</u> of nature are being exploited by man.
a)gifts b)rules c)products d)resources
2) The Robot was <u>fabricated</u> in our workshop.
a) operated b) designed c)constructed d) installed
3) John was found guilty in the scam.
a)right b)true c)innocent d)blamed
4) He is <u>meticulous</u> in his work .
a) irregular b)irresponsible c) careful d)clumsy
5) He was found to possess <u>lethal</u> weapons.
a) unlawful b)deadly c)sluggish d)smooth
6) He has immense <u>faith</u> in God.
a) proof b) belief c) response d) trust

VI. Match the following Idioms with their meanings (1/2x6=3)

1. At daggers drawn	a) to say or do exactly the right thing
2. At sixes and sevens	b) to lament what cannot be changed

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3. To hang in the balance	c) to give what is precious to those who don't understand its value
4. To hit the nail on the head	d) bitterly hostile
5. To cast pearls before the swine	e) in disorder or confusion
6. To cry over spilt milk	f) to be in doubt or suspense

VII.Write a brief note on each of the following: **(2x4=8)**

VII. Who are the people who influenced APJ Abdul Kalam in his childhood?
VIII. Explain briefly the structure and parts of a paragraph.
IX. Write a short note on the styles of communication.
X.What are the major barriers to communication?

PART-B (5 x 10 = 50 Marks)

1. What is the significance of Communication skills? How important are they for an engineer?
2. Sachin Tendulkar is an iconic cricket player. Substantiate this statement by presenting a glimpse of his life.
3. Write a letter to the editor, Deccan Chronicle, complaining about the bad condition of the roads and its hazards in your locality.
4. 'Persuasion techniques play a vital role in influencing friends and coworkers'. List some of the persuasion techniques one can use to be successful in life.
5. Outline the various stages of Knapp's relationship model. How relevant is the model to our cultural context?
6. What are the dos and don'ts while drafting an E-mail?
7. What are the characteristics of a good report?

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Code No. 11395/CBCS/S

FACULTY OF ENGINEERING

B.E. (Civil) III - Semester (CBCS) (Suppl.) Examination, May/June 2018

Subject : Strength of Materials – I

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

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

PART – A (20 Marks)

1. Define Bulk modulus. Give the relation between Young's modulus (E) and Bulk modulus (K).
2. Determine the section modulus of a hollow circular section whose internal and external diameters are 80mm and 100mm respectively.
3. Explain what is meant by a flitched beam with a neat sketch?
4. Define core of a section. Sketch the core of a rectangular section bxd.
5. Calculate the maximum shear stress across a beam of circular section subjected to a shear force of 90 kN .
6. Construct Mohr's circle for a body subjected to a pure shear of 40 MPa.
7. What do you mean by Point of contraflexure?
8. Write Lame's equations for radial pressure and hoop stress distribution along the thickness of a cylinder and explain parameters in it.
9. What is a compound cylinder?
10. Explain the concept of shear centre.

PART- B (50 Marks)

11. 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 bar.

12. A steel rod of 20mm diameter passes through a copper tube of 36mm external and 24mm internal diameter. The rod and tube are screwed together at ends at a temperature of 50^oC. Calculate the stresses in rod and tube when the temperature of the assembly is raised to 150^oC. E_s=200 GN/m^2, E_c=100 GN/m^2, $\alpha_s=12x10^{-6}$ /^oC & $\alpha_c=18x10^{-6}$ /^oC

13. Draw shear force and bending moment diagrams for the simply supported as shown in fig.1.

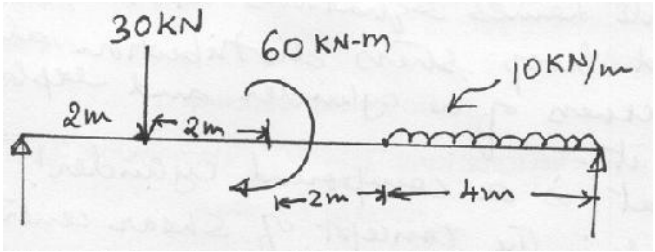

Fig-1

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14 Sketch the shear stress distribution across an I-section whose flanges are 120mmx10mm each and the web is 150mm deep with 10mm thickness, subjected to a shear force of 200kN.

15 A point in a strained material is subjected to direct stresses of 200MPa(tensile) and 120 MPa (compressive) acting in two mutually perpendicular directions and accompanied by shear stress. Calculate the intensity of shear stress if the major Principal stress is limited to 210 MPa. Also, find the minor principal stress and maximum shear stress.

16 A thin cylinder of internal diameter 800mm and 1m long is subjected to an internal pressure of 8N/mm^2.Find the change in diameter and volume of the cylinder if the permissible stress in the cylinder is 100N/mm^2. E=200GN/m^2 and y=0.3

17 a) A simply supported beam 4m long is subjected to a load of 6 kN at mid span, inclined at 30^o with vertical in the transverse section and passing through the centre of the rectangular section as shown in fig2. Calculate the stress at corner A.

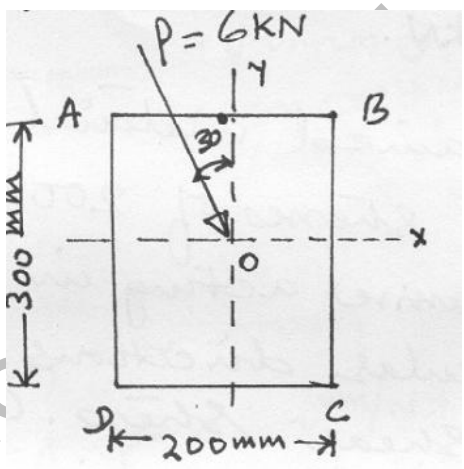

Fig-2

b) A channel section has flanges and web 100mm and 150mm overall length respectively and both are 20mm thick is placed with web vertical. Locate the shear centre.

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Code No: 11399/CBCS/S

FACULTY OF ENGINEERING

B.E III- Semester (CBCS) (EEE) (Suppl.) Examination, May / June 2019

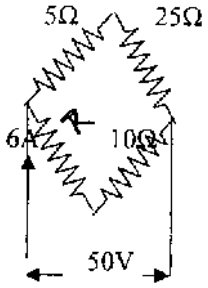
Subject: Electrical Circuits-I

TIME: 3 HOURS **MAX. MARKS: 70**

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

Part – A (20 Marks)

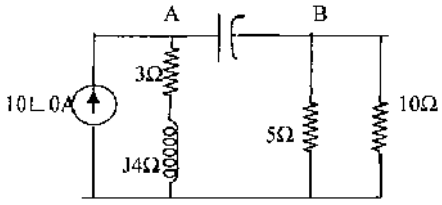
1. Differentiate between independent & dependent sources
2. Determine the value of R & current in each branch



3. In a given R-L circuit R= 3.5ΩL= 0.1H .Find a) the current through the circuit b) p.f if a 50HZ voltage of 220 at 30º is applied across the circuit.
4. Define form factor & explain its significance .
5. State reciprocity theorem & where does it finds its application?
6. List the characteristics of series resonance circuit
7. Discuss the concept of three phase sequence? What is phase sequence?
8. What do you understand by balanced & unbalanced loads?
9. Derive relation between self inductance, mutual inductance & coefficient of coupling.
10. Discuss the significance of transient & steady state part of the response

Part-B (50 Marks)

11. Determine the current through the branch AB of the given network using a) nodal analysis b) Loop analysis [10M]



12. a) A 0.0015μF capacitor is connected in parallel with a coil of resistance 75 Ω & 25mH inductance .Calculate the impedance of the circuit at resonance & its bandwidth [5M]

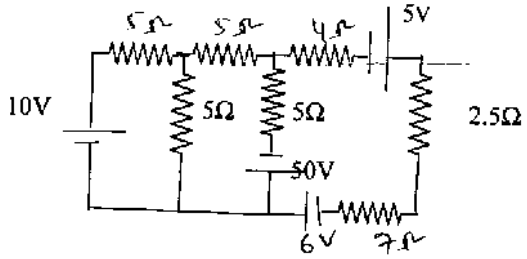
    b) An alternating voltage of (80+j60)V is connected to a circuit & the current flowing is (-4+j10)A .Find a) impedance of the circuit b) power consumed c) reactive power d) phase angle [5M]

…2

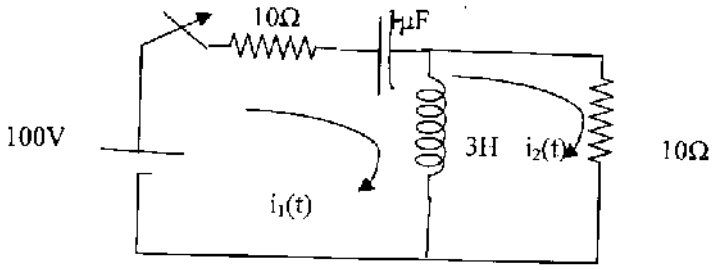
13. a) Three unequal non reactive resistances are mesh connected to a 440V ,symmetrical 3 phase system .If the line currents are 50,80 & 100A ,what is the total load ? If two wattmeters are connected in the circuit to measure the power input determine the reading on each instrument .The current coils are connected in the lines carrying 50 & 100A [5M]

b) The currents in RY ,YB & BR branches of a delta connected system with symmetrical voltages are 25A at 0.8 p.f lag ,30A at 0.7 p.f lag & 20A at UPF repectively. Determine the currents in each line ,phase sequence RYB [5M]

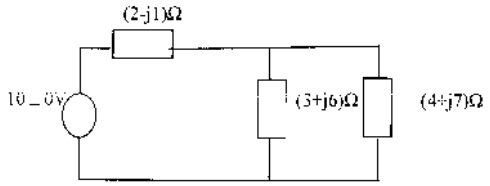
14. Determine the current through 2.5Ωresistor using Thevenin's theorem & Norton's theorem in the network [10M]



15. In the network shown below determine the current expression for $i_1(t)$ & $i_2(t)$ when the switch is closed at t=0 .Assume the initial conditions to be zero [10M]



16. a) Find the average power delivered to each impedance in the circuit shown [5M]



b) Explain the concept of Dot convention [5M]

17 a) A RLC series circuit has a current which lags behind the applied voltage by 45 degrees .The voltage across inductance has maximum value equal twice the maximum of voltage across capacitor . The voltage across inductor is given by 30sin1000t . If R=20 ohms find the values of L &C [6M]

b) An alternating current of frequency 60HZ has a maximum value of 12A

a) Write down the equation for instantaneous values
b) Find the value of current after 1/360 sec
c) Time taken to reach 9.6A for the first time [4M]

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Code No. 11403 / CBCS/S

FACULTY OF ENGINEERING

B.E. III-Semester (CBCS) (Inst) (Suppl.) Examination, May/June 2019

Subject: Network Theory

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

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

Paper – A (20 Marks)

1. Calculate resistance R such that it receives maximum power for the circuit shown in fig1 [2M]

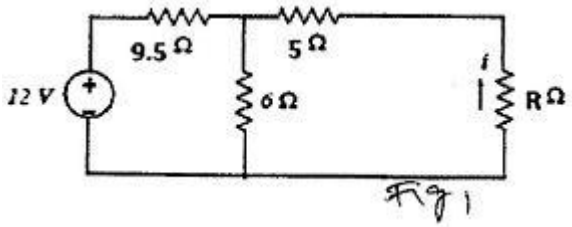
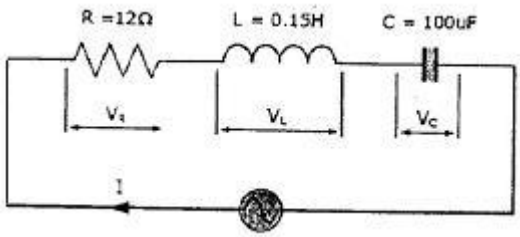


Fig 1

2. Derive an expression for energy stored in inductance. [2M]
3. Define time constant , what is time constant for RC circuit. [2M]
4. The following equations give the voltages V_1 and V_2 at the two ports of a two port network. $V_1=8I_1+10I_2$, $V_2=6.5I_1+9I_2$. Find Y- parameters. [2M]
5. For given RLC circuit if $V = 100\angle 2(55^o)$, find i(t) and total active power. [2M]



6. Explain the behavior of inductor and capacitor for DC supply. [2M]
7. What are the coupled circuits, define mutual inductance. [2M]
8. Draw impedance curve for parallel resonant circuit. [2M]
9. Find equivalent resistance for the circuit shown in fig2 between terminals A & B. [2M]

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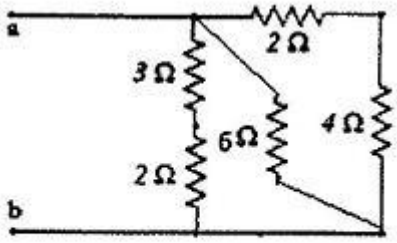

Fig 2

10. Draw vector diagram for series RL circuit. [2M]

PART-B (50 Marks)

11. For the network shown in figure3 determine by loop method , the voltage across 36A current source. [10M]

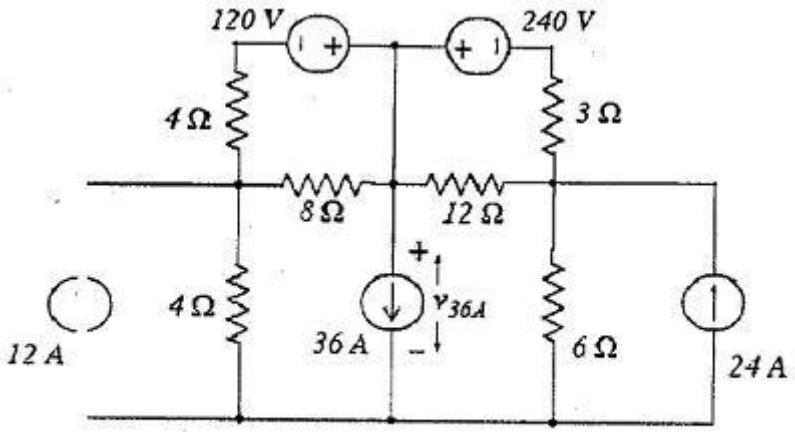

Fig 3

12. (A). state and explain Norton's theorem. [4M]

(B). find thevenins equivalent for the circuit shown in fig 4 [6M]

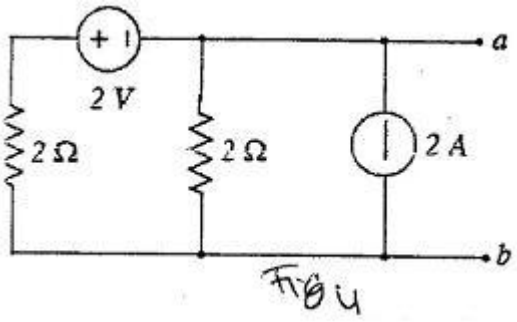

Fig 4

13. A star connected balanced load is supplied from a 3-ϕ balanced supply with a line voltage of 416V at a frequency of 30Hz. Each phase of load consists of a resistance and a capacitor connected in series. The readings of two wattmeter connected to measure total power supplied are 782W and 1980W , both positive. Calculate:
    i) Power factor of the circuit
    ii) Line current
    iii) Capacitance of each capacitor. [10M]
    iv)
14. Two coupled coils with L_1=0.02H, L_2=0.01H & K=0.5 are connected in four different ways: series aiding , series opposing , parallel aiding & parallel opposing. Find the equivalent inductance in each case and also draw their equivalent circuit connection with proper placement of dots. [10M]

15. A 50Ω resistor and a 20mH coil are connected in parallel across a 50V , 100Hz supply as shown in figure 5. calculate the total current drawn from the supply , the current for each branch, the total impedance of the circuit and the has angle. [10M]

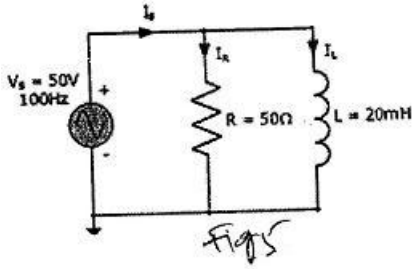

Fig5

16. Obtain Z & Y circuit parameters for the network shown in fig 6. [10M]

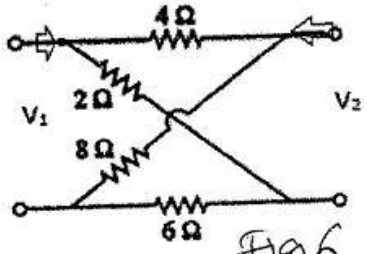

Fig6

17. In the network shown , in figure 7 the switch is kept open for a long time and then it is closed at t=0. Find $i_c(0^+)$ $V_C(0^+)$ $V_C(0^+)$. [10M]

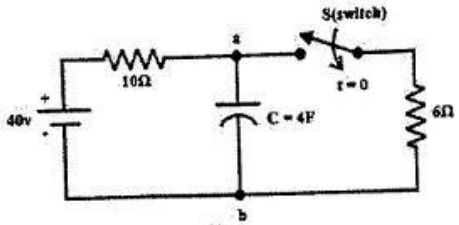

Fig7

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Code No:11407/CBCS/S

FACULTY OF ENGINEERING

BE (ECE) III - Semester (CBCS)(Suppl.) Examination MAY/June 2019

Subject : SIGNAL ANALYSIS & TRANSFORM TECHNIQUES

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

Note: Answer all questions from **Part-A** at one place in the same order
Answer any **five** questions from **Part-B**

Part - A (20 Marks)

1. Describe properties of unit impulse function? (2)
2. Define deterministic and random signals? (2)
3. State Dirichlet's conditions? (2)
4. Distinguish between Energy Spectral Density and Power Spectral Density? (2)
5. State and prove frequency Convolution theorem associated with Fourier Transform? (2)
6. Describe initial and final value theorems of Laplace Transforms? (2)
7. Distinguish between Laplace and z-transforms? (2)
8. Find X( ) if X(s) = [s-2] / [s(s+4) (2)
9. State differentiation property in association with Z-domain? (2)
10. What are the applications of Discrete time Fourier Transform? (2)

Part - B (50 Marks)

11. (a) Find the Fourier Transforms of the following signals
x(t) =[e^{-2t} Cos(5t) U(t)] ; b. x(t) = Cosw_0t U(t) (5)

(b) Find inverse Fourier Transform of X(w) = exp(-2w) u(w) and X(w) = 2Π( ) (5)

12. (a) Describe in detail wave symmetry types with illustrations? (5)

(b) Find the Laplace transform of x(t) = exp(-at) u(t)? plot ROC? (5)

13. (a) Find the Laplace transform of the signal x(t) = {t^2 e^{-3t} Sinw_0t U(t) } ; plot ROC (5)

(b) Find inverse Laplace transform of X(s) = [s/ (s+1) (s+2)]; (5)

14. An LTI system is described by the difference equation
[y(n) - (3/4) y(n-1)+ (1/8)y(n-2)] = [x(n) + x(n-1); with y(-1) = 0 & y(-2) = -1; 10
Find frequency response for step input?

15. (a) Obtain a relation between Convolution and Correlation? (5)

(b) Find the Autocorrelation of x(t) = [A Sin (ω_0t + Θ)]; (5)

16. (a) Find inverse Laplace-transform of the following signals? (5)
X(s) = Log (1+s/ s^2); X(s) =Log{(s^2 + a^2) /(s^2-b^2)}?

(b) What are the advantages of Laplace Transform over Fourier transform? (5)

17. (a) State properties of Discrete Fourier Series (5)

(b) Obtain an expression for Autocorrelation function and Power Spectral Density? (5)

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Code No. 11411/CBCS

FACULTY OF ENGINEERING

B.E. III-Semester (M / P) I – Semester (CBCS) (Main & Backlog) Examination, May / June 2019

Subject : Metallurgy & Material Science

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

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

PART – A (20 Marks)

1 Distinguish between Edge and Screw dislocations with sketch.
2 What is strain hardening?
3 Define Fatigue. List the factors affecting fatigue.
4 State and Fick's first law of diffusion.
5 Define the term solid solution. Mention different types of solid solutions.
6 Explain the allotropy of Iron with the help of cooling curve.
7 Hardening is not the final heat treatment process for steels. State the reasons.
8 State the advantages of the process of full annealing.
9 Sketch join defect.
10 Write the properties and applications of managing steel.

PART – B (50 Marks)

11 (a) Discuss slip and twining as mechanism of permanent deformation.
(b) Explain different modes of fractures with the help of neat sketches.

12 (a) What is creep? Explain various stages of creep curve with the help of a neat sketch.
(b) What is diffusion? Explain the industrial applications of diffusion process.

13 (a) Draw Iron-Iron carbide phase diagram and label all points, lines and areas.
(b) Explain the invariant reactions that occur on Iron-Iron carbide phase diagram.

14 (a) What is age hardening? Explain the steps involved in age hardening process.
(b) Differentiate Austempering with Martermpering process.

15 (a) Explain the steel making process using Bessemer converter.
(b) Explain the effects of various alloying elements on properties of steel.

16 (a) Explain the production of cast iron using cupola furnace.
(b) What is case hardening? Explain carbonitriding process.

17 Write short notes on the following:
(a) Point defects
(b) Cumulative fatigue
(c) Copper zinc alloys

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Code No: 11413/CBCS

FACULTY OF ENGINEERING

B.E. III Semester (AE)(CBCS) (Suppl.) Examination, May/June 2019

Subject: Thermal Engineering

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

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

PART – A (10x2=20 Marks)

1. Define Thermodynamic equilibrium.
2. Define SFEE.
3. What is a heat pump?
4. Define PMM-II
5. Sketch P-V diagram of Brayton Cycle.
6. Difference between open cycle and closed cycle Gas Turbine.
7. Give the importance and use of Mollier diagram.
8. What is unit of Refrigeration.
9. What are the uses of compressed air.
10. Give the advantages and disadvantages of Hydrogen Fuel.

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PART – B (5x10=50 Marks)

11. (a) Derive Steady flow energy equation for one inlet and two outlets.
    (b) 0.8 kg/s of air through a compressor under steady state conditions. The properties of air at entry are: Pressure 1 bar, Velocity 10m/s, specific volume 0.95m^3/kg and internal energy 30kJ/kg. The corresponding values at exit are Pressure 8 bar, velocity 6m/s, specific volume 0.2m^3/kg and internal energy 124kJ/kg, the outlet is inline with intake.
    Determine the power input to compressor and the pipe diameter at entry and exit.

12. (a) Derive Clausis inequality & State its significance.
    (b) In a reversible process the rate of heat transfer to the system per unit temperature rise is given by dQ/dT=0.5kJ/^oC. find the change in entropy of the system if its temperature rises from 500K to 800K.

13. (a) Explain Brayton Cycle and derive its efficiency.
    (b) A gas turbine unit has a pressure ratio of 6:1and maximum cycle temperature of 610^oC. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively calculate the power output in kilowatts of an electric generator geared to the turbine when the air enters the compressors at 15^oC at the rate of 16kg/s.
    Take C_p=1.005 kJ/kg K amd ¥ =1.4 for the compression process, and C_p=1.11kJ/kgK and ¥ =1.333 for the expansion.

..2

14. (a) Explain the working of Vapour compression system with the help of layout diagram and graphs.
    (b) In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 35 bar and the exhaust pressure is 0.2 bar, Determine (i) The pump work (ii) The turbine work (iii) The Rankine efficiency. Assume flow rate is 9.5 kg/s.

15. (a)What are the objectives and advantages of Hybrid system.
    (b)A single stage single acting air compressor delivers $15m^3$/min of free air from 1 bar to 8 bar at 3004mp. The clearance volume is 6% of stroke volume and the compression & Expansion follows the law $PV^{1.3}$=Const. Calculate the diameter and stroke of compressor.

16. (a) Compare Vapour Absorption System and Vapour Compression System.
    (b) Derive the expression for work done in case of a 3 stage reciprocating air compressor with perfect intercooling.

17. (a) What are the limitations of first law of Thermodynamics.
    (b) one kg of ethane gas (R=0.277kJ/kg) is compressed from 1.1 bar, 27^oC according to the law $PV^{1.3}$=c, UNTIL THE PRESSURE IS 6.6 BAR. Calculate the heat flow to or from the cylinder walls, Cp=1.75kJ/kg-K

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Code No. 11419 / CBCS/S

FACULTY OF ENGINEERING

B.E. (CSE) III - Semester (CBCS) (Suppl.) Examination,
May / June 2019

Subject : Discrete Mathematics

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

Note: Answer all questions from Part-A & 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 State the pigeonhole principle.
3 What is a derangement?
4 Define converse and contra positive of an implication.
5 State the inclusion-exclusion principle.
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 chromatic number of a graph.
9 Define a) Semi group b) Monoid.
10 What do you mean by a minimal spanning tree?

PART – B (50 Marks)

11 a) Show that p v $(q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent without using truth table method. (5)
b) Construct truth table for the proposition $p \rightarrow q \rightarrow r \rightarrow s$. (5)

12 a) State and prove the fundamental theorem of arithmetic. (6)
b) Show that the premises "A student in this class has not read the book" and "Everyone in this class passed the first exam" imply the conclusion "Someone who passed the first exam has not read the book". (4)

13 a) Show that $f : R \rightarrow R$ given by $f(x) = 5x - 7$ is onto. (5)
b) Let $f : N \rightarrow R$ be a function defined by $f(x)=4x^2+12x+15$. Show that the function is invertible. (5)

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 $a_2 = -1$. (5)
b) Find all the solutions of the recurrence relation $a_n= 5a_{n-1} - 6a_{n-2} + 7^n$. (5)

15 a) Write the procedure for finding a minimum spanning tree of a graph using Prim's algorithm. Explain with an example. (8)
b) Define Hamilton path in a graph. (2)

16 a) If N is a normal subgroup of G, show that $xN = Nx$ for all $x \in G$. (5)
b) Show that a composition of homomorphisms is a homomorphism. (5)

17 Write short notes on any two of the following. (5+5)
a) Properties of algebraic system
b) Graph Coloring
c) Sub graph and complement of a graph with examples.

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Code No. 11421 / CBCS/S

FACULTY OF ENGINEERING

B.E. (IT) III-Semester (CBCS) (Suppl.) Examination, May / June 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 Prove that $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent.

2 State which rule of inference is basis for the following argument, "it is below freezing now", therefore it is either below freezing or raining now.

3 What is the Cartesian product A x B x c, where A = {0, 1}, A = {1, 2} and C = {0,1,2}.

4 Find the GCD of 91 and 287 using Euclidean algorithm.

5 What is the value of $\sum_{j=1}^{5} j^2$.

6 How many permutations of the letters ABCDEFGH contain the string ABC?

7 What is the probability of getting the sum of numbers on 2 fair dice as 10 if they are tossed?

8 Define a partial ordering

9 Define (i) pendant vertex (ii) Hamilton cycle

10 What is the value of the postfix expression $723 * -4 \wedge 931 +$?

PART – B (50 Marks)

11 a) Show that the following compound proposition is tautology $[(p \vee q) \wedge (p \to r) \wedge (q \to r)] \to r$ 5

b) Prove by direct method that If n is odd, then n^2 is odd. 5

12 a) Let f(x) = x+2, g(x)x-2, h(x) = 3x and x ϵ R (R-real numbers). Find gof, fog, foh, hog, hof, fohog. 5

b) Find 7^{644} and 645. 5

13 a) Use mathematical induction to prove that n^3-n is divisible by 3 when ever 'n' is a positive integer. 5

b) If 'f' is recursively defined by f(0)=3, f(n+1) = 2f(n)+3. Find f(1), f(2), f(3), f(4). 5

14 a) Find all the solution of the recurrence relation $a_n = a_{n-1} + 2a_{n-2}$. What is the solution with $a_0 = 2$, a = 7. 5

b) What is the variable for random variable n, where x is number that comes up when a die is rolled? 5

15 a) Draw the Hasse diagram representing the partial ordering {(a,b) / 'a' divides 'b'} on {2,4,5,10,12,25}. 5

b) State and prove Euler's formulae on planar graphs. 5

16 a) Explain Kruskal's algorithm to find the minimum spanning tree of a graph with an example. 5

b) What are the difference tree traversal mechanisms? Explain with examples. 5

17 Find the k-map for a) $xy + \bar{x}y$ b) $\bar{x}y + x\bar{y}$ c) $\bar{x}\,\bar{y} + \bar{x}y + x\bar{y}$ and simplify the sum of products. 10

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