Code No.2014/BL

FACULTY OF ENGINEERING

B.E. 2/4 (Civil) I- Semester (Backlog) Examination, October 2020

Subject: Strength of Materials – I

Time: 2 hours **Max. Marks: 75**

PART – A

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

1 Define lateral and longitudinal strain

2 Explain flitched beam.

3 What is a perfect truss?

4 What is a prestressed cylinder. Explain with sketch.

5 What are principal stresses?

6 Sketch the bending stress and shear stress distributions for a rectangular section.

7 Draw BMD for a cantilever beam of length 3m subjected to a UDL of 9kN/m over 2m from its free end

8 State and prove middle third rule for core of solid rectangular section.

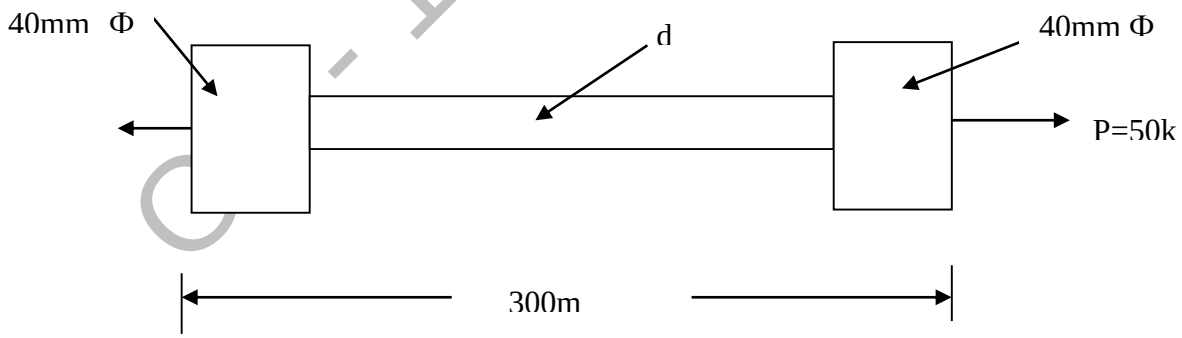
9 Differentiate between thin and thick cylinders

10 Mention assumptions made in torsion equation

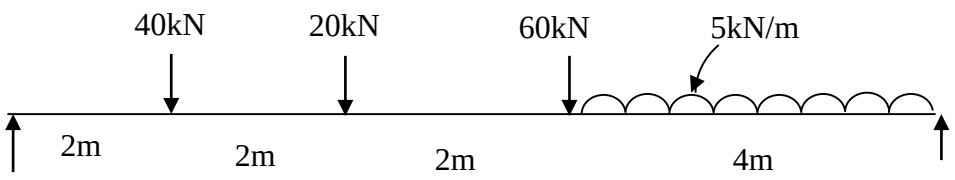
PART – B

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

11 A round bar as shown in figure is subjected to a tensile load of 50kN. What must be the diameter at the middle portion if the stress there is not to exceed 200N/mm^2. What should be the length of this middle portion if the total extension in the bar is 0.112mm? Take E= 100Gpa.



12 Construct S.F. and B.M. diagrams for the simply supported beam as shown in the figure



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13 The cross section of a beam is a T-section having flange 120mm x 10mm and web 10mm x 150mm. Calculate the shearing stresses induced in the beam section due to a sheer force of 90kN. Also sketch the shear stress distribution across the section of

beam.

14 A thick cylinder of internal diameter 200mm is required to withstand a pressure of 30N/mm^2.If the permissible hoop stress is 120N/mm^2, Calculate the external diameter and minimum value of hoop stress in the cylinder. Sketch the radial pressure and hoop stress distribution across the section.

15 A point in a strained material is subjected to direct stresses of 140N/mm^2(tensile) and 80 N/mm^2(compressive) in two mutually perpendicular directions. It is also accompanied by shear stress of 30N/mm^2.Calculate principal stresses, position of principal planes and maximum shear stress.

16 Derive the flexure equation and state the various assumptions made in it.

17 A steel bar 250mm long and 50mm x 40mm in section is subjected to a tensile force of 50kN in the direction of length. Find the changes in length, width, thickness and volume, if E=220kN/mm^2 and μ=0.3.

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Code No. 2019/BL

FACULTY OF ENGINEERING

B.E. 2/4 (EEE) I – Semester (Backlog) Examination, October 2020

Subject: Principles of Mechanical Engineering

Time: 2 hours **Max. Marks: 75**

PART – A

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

1. Define (a) Radiation (b) Convection.
2. What are eco friendly refrigerants?
3. Define (a) Indicted power (b) 4-Stroke engine.
4. Classify boilers.
5. What is epicyclic gear train?
6. Explain the phenomena of Slip and Creep in belt drives.
7. What is Hagen's formula?
8. What are unit quantities in turbines?
9. Draw the velocity triangles of centrifugal pumps.
10. Draw the indicator diagram showing acceleration head at suction and discharge.

PART – B

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

11. (a) Differentiate between parallel flow and counter flow heat exchanger.
    (b) Explain summer air conditioning system.
12. (a) Give the advantages of multi stage compression.
    (b) Explain the working of constant pressure gas turbine.
13. (a) Compare open and cross belt drives.
    (b) An open belt running over two pulleys 240mm and 600mm diameter connects two parallel shafts 3 meters apart and transmits 4kW from the smaller pulley that rotates at 300 rpm. Coefficient of friction between the belt and the pulley is 0.3 and the sage working tension is 10N per mm width. Determine: (i) Minimum width of the belt, (ii) Initial belt tension and (iii) Length of the belt required.
14. (a) Explain the working of Venturimeter and derive the expression for discharge through Venturimeter.

…..2

(b) It is desired to generate 1000kW of power and survey reveals that 450 m of static head and a minimum flow of $0.3m^3/s$ is available. Comment whether the task can be accomplished by installing a Pelton wheel that turns 1000 revolutions per minute and has an efficiency of 80%.

Further design the Pelton wheel by assuming suitable data for coefficient of velocity, speed ratio and velocity coefficient of velocity, speed ratio and velocity coefficient, for the jet.

15. (a) What are air vessels. Explain their significance in reciprocating pumps.

(b) A centrifugal pump having an overall efficiency of 72% delivers $0.03m^3/s$ of water to a height of 20m through a 10cm diameter pipe 80m long, taking friction coefficient f=0.01, calculate the power required to run the pump.

16. (a) What are reversible and irreversible processes.

(b) In single stage single acting air compressor of 30cm diameter, 40cm stroke makes 100 RPM takes air at 1 bar 20^0C to a pressure of 5 bar. Calculate mean effective pressure and power required to derive it when compression is isothermal and adiabatic.

17. (a) What are desirable properties of refrigerants.

(b) What are gear trains? Explain Compound and Inverted gear trains with examples.

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Code No.2027

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) I-Semester (Backlog) Examination, October 2020

Subject : Elements of Mechanical Engineering

Time : 2 hours **Max. Marks : 75**

PART – A

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

1. Define second Law of Thermodynamics.
2. Explain Fourier Law of conduction.
3. Differentiate between a two stroke and a four stroke I.C. Engine.
4. What is the effect of clearance volume in an air compressor?
5. Explain the importance of LMTD in a heat exchanger
6. What are the desirable properties of a good refrigerant?
7. Differentiate between welding and brazing.
8. What are the properties of moulding sand.
9. What is the condition for maximum power transmission for flat belt.
10. Define Kinematic pair and mechanism.

PART – B

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

11 a) Explain thermodynamic cycle and quasistatic process

b) In a gas turbine, the flow rate of air is 4 kg/s. The velocity and enthalpy of air at entrance are 250 m/s and 6930 KJ/Kg respectively. At exit, the velocity is 170 m/s and enthalpy is 5040 KJ/Kg as the air flows through turbine. Calculate the power developed by the turbine.

12 a) With the help of a neat sketch, explain the working of a four stroke C.I. Engine

b) Derive the equation for LMTD in parallel flow heat exchanger.

13 a) Explain the working principle of a multistage compressor with an inter cooler.

b) A single acting single stage compressor has a cylinder with 200mm diameter and 300mm stroke. It runs at a speed of 500rpm. The index of compression and expansion is 1.3. The compression pressure is 6 bar abs. The clearance volume is 5% of stroke volume. Determine i) Volumetric efficiency ii) Brake power required to drive the compressor if mechanical efficiency is 75 percent.

14 a) Explain Newton's Law of cooling with suitable examples.

b) If the inner and outer surface temperatures of a simple brick wall are 40^0c and 20^0c. Calculate the rate of heat transfer per unit area if thermal conductivity of brick is 0.52 w/mc and thickness of wall is 250mm.

……2

15 a) Explain the working of simple vapour absorption system with neat sketch.

b) Describe the processes of heating and humidification by using a psychometric chart.

16 a) Describe the process of are welding process using a neat sketch

b) Briefly explain the processes of turning and drilling.

17 Write short notes on
a) Four Bar Chain Mechanism
b) Thermo electric refrigeration
c) Forming Processes.

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Code No.2031/BL

FACULTY OF ENGINEERING

B.E. 2/4 (M/P/AE) I-Semester (Backlog) Examination, October 2020

Subject : Managerial Economics and Accountancy

Time : 2 hours **Max. Marks : 75**

PART – A

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

1 What are the production decisions taken by a Manager?

2 Managerial economics is pragmatic in nature. Explain.

3 Differentiate between perfect competition and Monopoly.

4 What is veblen effect?

5 What is Break-even point? Write the formula.

6 Write any two internal economies.

7 Define ARR method.

8 Write any two sources of working capital.

9 Differentiate between Capital expenditure and Revenue expenditure.

10 What is contra-entry.

PART – B

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

11 Explain the basic concepts of Managerial economics and explain them.

12 Define the term Demand and explain its law with reference to price and income.

13 What do you understand by break-even analysis? Explain its managerial uses and limitations.

14 Consider the case of the company with the following two investment alternatives each costing Rs.9 Lakhs. The details of the cash inflows are as follows:

Cash inflow Rs.in Lakhs		
Year	Project 1	Project 2
1	3	6
2	5	4
3	6	3

The cost of capital is 10% per year. Which are will you choose under NPV method.

……2

15 From the following ledger balances of Mr. Bharat as on 31st March 2000, prepare Final Accounts.

Particulars	Debit (Rs.)	Credit (Rs.)
Capital account	-----	1,50,000
Drawings	10,000	-----
Plant & Machinery	40,000	-----
Opening stock	25,000	-----
Purchases and sales	1,74,000	2,60,000
Furniture	5,000	-----
Debtors and creditors	1,35,000	90,000
Wages	24,000	-----
Freight inward	4,000	-----
Salaries	22,000	-----
Printing & Stationery	9,000	-----
Rent, Rates & Taxes	12,000	-----
Bills receivable	33,000	-----
Bank	7,000	-----
	5,00,000	**5,00,000**

Adjustments:

1. Closing stock Rs.80,000.
2. A fire occurred on 1st March, 2000 and goods costing Rs.10,000 were destroyed. Insurance company accepted a claim of Rs.8,000.
3. Write off Rs.7,500 as bad debts.
4. Purchases include purchase of furniture Rs.2,000 for the Personal use of Mr. Bharat.

16 What is a Trial Balance? Why it is prepared? Is the agreement of Trial Balance a conclusive proof of the accuracy of accoutns.

17 Explain the internal and external economies of scale.

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Code No. 2038/BL

FACULTY OF ENGINEERING

B.E. 2/4 (CSE) I – Semester (Backlog) Examination, October 2020

Subject: Basic Electronics

Time: 2 hours **Max. Marks: 75**

PART – A

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

1. Differentiate Extrinsic and intrinsic semi conductors.
2. In a filtered Bridge rectifier, the power supply transformer has a turns ratio of 10:1. The primary is connected to a 115 V, 60 Hz source. The filter consists of C = 50 μF and R_L = 2.2KΩ. Determine ripple factor.
3. Define β of a transistor.
4. How is the drain current controlled in a JFET?
5. What is the effect of negative feedback on the bandwidth of an amplifier?
6. What is Barkhansen criterion for the oscillator?
7. Define slew rate for an Op-amp.
8. Design a full adder circuit using two half-adders.
9. A strain gauge has a gauge factor of 4. If this strain gauge is attached to a metal bar that stretches from 25 cm to 25.2 cm, calculate ΔR, if its unstrained resistance is 120Ω.
10. Mention the advantages and applications of CRO.

PART – B

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

11. (a) What is an ideal diode? How does an actual diode differ from an ideal diode?
    (b) Explain the working of 'C' filter for rectifier circuit and mention its advantages over L-filter. [5]
12. (a) Draw BJT characteristics for CE configuration and explain various operating regions.
    (b) Explain the advantages of JFET over BJT.
13. (a) The voltage gain of an amplifier without feedback is 60 dB. It decreases to 40 aB with feedback calculate the feedback factor β.
    (b) Explain the operation of RC phase shift oscillator and give the expression for its frequency. [6]
14. (a) Explain the working of OP-amp based summer circuit.
    (b) Give the truth tables of Half subtractor and full adder.
15. Explain the construction and working of LVDT.
16. (a) Explain how a Zener diode can be used as a voltage regulator.
    (b) Explain the working of CRO with neat block diagram.
17. Explain the construction and working of n-channel JFET.

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Code No.2043/BL

FACULTY OF ENGINEERING

B. E. 2/4 (IT) I – Semester (Backlog) Examination, October 2020

Subject: Data Structures

Time: 2 hours **Max. Marks: 75**

PART – A

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

1. How do we analyze the performance of an algorithm?
2. What are the different types of linked lists?
3. Define a sparse matrix and give an example.
4. Explain the different splay tree operations.
5. Differentiate internal and external sorting.
6. Define a minimal spanning tree. Explain with an example.
7. Define a hash function.
8. Explain maxheap with an example.
9. What is a threaded binary tree?
10. Given the binary traversal of a binary tree. Draw the tree.
    Preorder : D Q B A F N G
    Inorder : Q B D N F A G

PART – B

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

11. (a) What are the asymptotic notations? Explain with examples.
    (b) Write an algorithm to convert infix expression to postfix expression using stacks. Explain with an example.
12. Write algorithms for insertion and deletion into a binary search tree. Explain with an example. 10
13. (a) Write an algorithm to implement stack using linked list.
    (b) Explain collision handling techniques in hashing.
14. (a) Write a C++ program to implement Kruskal's algorithm.
    (b) Write algorithm for DFS traversal of a graph.
15. Write a C++ function for implementing quick sort and trace the algorithm for the following elements.

    44, 12, 34, 1, 12, 10, 77, 9, 166, 18.

16. Write a C++ program to implement various operations of a Double Linked List.
17. Write notes on the following:
    (a) Merge sort.
    (b) Hash functions.

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Code No.2523/BL

FACULTY OF ENGINEERING

B.E. (Civil) III-Semester (CBCS) (Backlog) Examination, October 2020

Subject : Strength of Materials-I

Time : 2 hours **Max. Marks:70**

PART – A

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

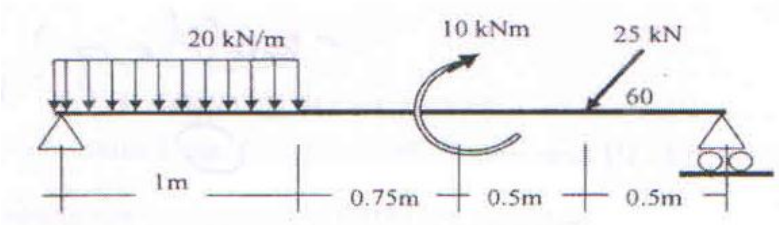
1 Distinguish between different types of strain with illustrations.
2 Define longitudinal strain, lateral strain and Poisson's ratio. What is its range of values?
3 Draw the Shear Force and Bending Moment Diagrams for a Cantilever of length L carrying a uniformly distributed load 'w' kN per metre throughout its length.
4 Define Section modulus. Derive the expression for section modulus of a hollow rectangular section of external dimensions (in mm) B and D, and internal dimensions b and d.
5 Sketch the shear stress distribution due to shear force, V kN, at a rectangular cross-section.
6 Define core of a section. Illustrate the core of a hollow rectangular section.
7 Define Principle Stress at a point in a material. Give the expressions for principal stresses and maximum shear stress for a stressed element subjected to two perpendicular normal stresses and a shear stress along its edges.
8 What is a compound cylinder? What are its advantages over a thick cylinder?
9 Explain unsymmetrical bending of a beam using a diagram.
10 Define shear flow and shear centre.

PART – B

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

11 A gun metal rod 20 mm diameter, screwed at the ends, passes through a steel tube 25 mm and 30 mm internal and external diameters respectively. The nuts on the rod are screwed tightly home on the ends of the tube. Find the intensity of stress in each metal, when the common temperature rises by 20 deg C. Take Young's modulus of elasticity for steel and gun metal as 200 GPa and 100 GPa respectively. Take the coefficient of expansion for steel and gun metal as 6×10^{-6} and 10×10^{-6} per deg C.

12 Sketch the SFD and BMD for the simply supported beam loaded as shown in the figure below. Also find the point of contra flexure, if any.



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13 Sketch the shear stress distribution across the T-section which is subjected to a shear force of 250 kN. The dimensions of the flange and the web are 120mm x 20mm and 20mm x 180mm, respectively.

14 A point in a strained materials is subjected to stresses of 100 N/mm^2 (tensile) and 40 N/mm^2 (compressive) in two mutually perpendicular directions and accompanied by a simple shear stress of 20 N/mm^2. Calculate principal stresses and position of principal planes. Also, calculate the normal and tangential stresses on a plane making 30^0 with the axis of compressive stress.

15 A cantilever beam 4 m long is subjected to a point load of 600 N at its free end. The point load is inclined at 300 clock wise from the vertical. The beam is of uniform rectangular cross-section of dimensions 150 mm x 30^0 mm. calculate the stresses at all four corners of the cross-section at the fixed end.

16 A beam AB of 4 m span is loaded with a central point load of 60 kN. The section of the beam is a rectangle 150 mm wide and 300 mm deep. At a cross-section distant 2 m from support, calculate bending and shear stress at a distance of 40 mm from neutral axis.

17 A short hollow column having outer sides (2m x 2m) and inner sides (1.5 m x 1.5 m) supports a vertical load of 100 kN on the inner diagonal, at a distance of 0.5 m from the vertical axis of the column passing through centre O. find the stresses developed at the 4 corners of column top face.

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Code No. 2530/CBCS/BL

FACULTY OF ENGINEERING

B. E. III – Semester (CBCS) (EEE) (Backlog) Examination, October 2020

Subject: Electrical Circuits - I

Time: 2 hours **Max. Marks: 70**

PART – A

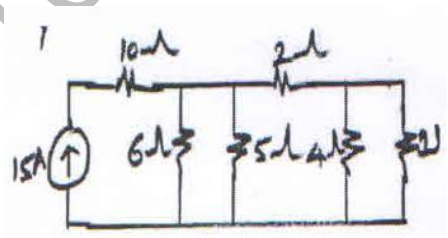
Note: Answer any five questions. **(5x2 = 10 Marks)**

1. Distinguish between Linear and non-linear elements and give examples.
2. Discuss energy stored in capacitor.
3. Define Crest factor and form factor.
4. A series connected RC circuit has a resistor of 50 Ω and capacitive reactance of 25 Ω. What is its impedance and phase angle?
5. State Thevenin's theorem.
6. State Reciprocity theorem.
7. Compare star and delta connections of a 3-phase system in any three aspects.
8. Give analogy between magnetic and electric circuit.
9. Define time constant in RL circuit.
10. What is the difference between steady response and transient response?

PART – B

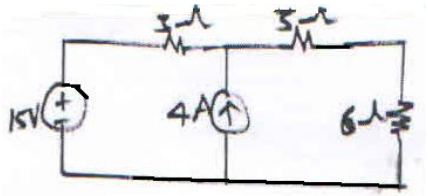
Note: Answer any four questions. **(4x15 = 60 Marks)**

11. Determine the current flowing through the 5 ohm resistor in the below circuit by using Nodal Analysis.



12. A Series connected RLC circuit consists of 50 Ω resistance, 0.2 H inductance and 10 μF capacitor with an applied voltage of 20V. Determine the resonant frequency and quality factor of the circuit. And compute lower and upper frequency limits. Bandwidth of the circuit.

13. Write procedure for solving circuit using Norton's theorem and calculate current through 6 Ω resistor in the circuit shown below by superposition equivalent.



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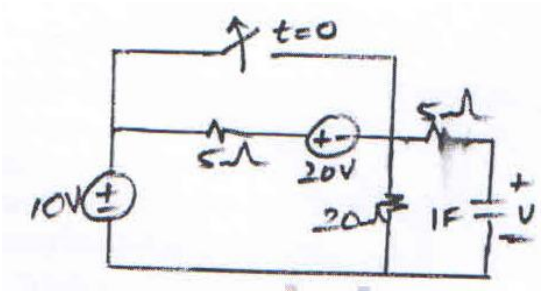
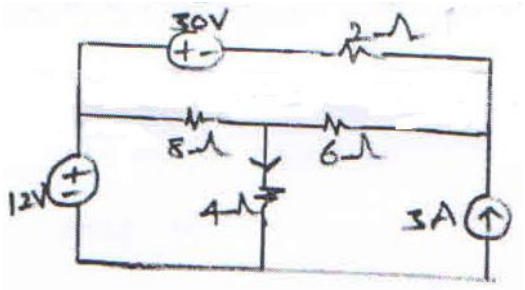
14. A balanced RYB phase sequence star connected $V_{RN}=100\angle 10^0$ V is connected to a delta connected balanced load (8+j4) Ω per phase. Calculate the phase and line currents.

15. Determine the voltage across the capacitor for the circuit shown in the figure below.



16. Derive the quality factor of series connected RLC circuit at resonance.

17. Write procedure for solving circuit using superposition theorem and calculate current through 4Ω resistor in the circuit shown below by superposition equivalent.



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Code No.2532/CBCS/BL

FACULTY OF ENGINEERING

B.E.III- Semester (Inst.)(CBCS) (Supplementary) Examinations, October 2020

Subject: Network Theory

Time: 2 Hours **Max. Marks: 70**

PART – A

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

1. What do you mean by linear and non linear elements?
2. State super position theorem.
3. Define time constant of R-L circuit excited D.C source.
4. Explain about Steady state or forced response.
5. What is the significance of phase sequence?
6. Draw the impedance triangle and explain each term.
7. What is resonance? Find the condition for resonance in a RLC circuit.
8. Two watt meters connected to a 3-phase motor indicate the total power input to be 12 kW. The power factor is 0.6. Determine the readings of each wattmeter.
9. Define Port and Two-port network.
10. Why y-parameters are called as short circuit parameters?

PART – B

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

11. (a) Obtain the expressions for energy stored in inductance and capacitance

    (b) For the network shown in figure-1, find equivalent resistance between the points A & B, applying star – Delta transformation technique.

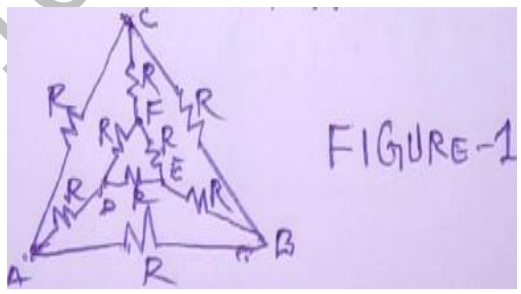

FIGURE-1

12. (a) In the circuit shown in figure-2, switch closes at $t = 0^+$, find the values of I, di/dt, d^2i/dt^2 at $t = 0^+$

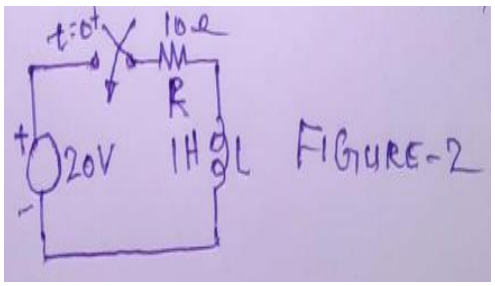

FIGURE-2

(b)Find the current i(t) in a series R-C circuit consisting of R = 2 Ω and C = 1/4 Farad, when each Of the following driving force is applied. (i) Ramp voltage 2r (t-3) and (ii) step voltage 2u (t-3)

Contd..2

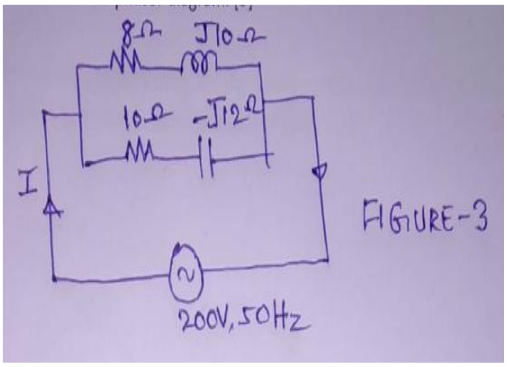

FIGURE-3

13. (a) A current of 4A flows through a pure resistor in series with a coil when 200 volts is applied. The voltage drop across pure resistor is 100 volts and across the coil is 160 volts. Find

(i) Impedance, resistance and reactance of the coil

(ii) Power consumed in the coil

(iii) Total Power

(b) Determine the current drawn by the following circuit of figure-3 when a voltage of 200 volts is applied across the same. Draw the phasor diagram.

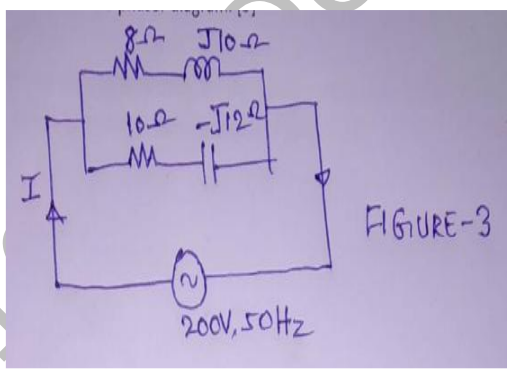

FIGURE-3

14. (a) The circuit components of a parallel circuit shown in Figure-4 are R = 60 kΩ, L = 5mH, and C = 50 pF. Find

i) The resonant frequency, f_0,

ii) The quality factor, Q, and

iii) The bandwidth

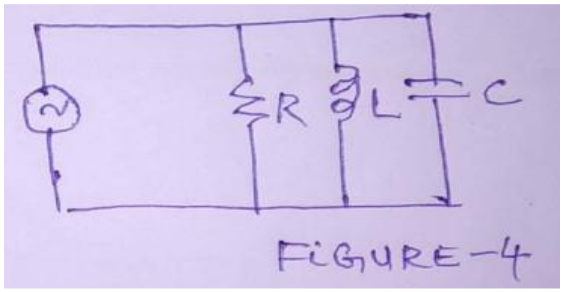

FIGURE-4

(b) A three phase three wire systems has a balanced star connected load with a 60Ω resistance in each phase. The circuit is supplied with a balanced supply of 150V, 50 Hz. Determine the line current. And line power.

Contd..3

15. (a) For the network shown in the figure-5, determine hybrid parameters and using these parameters calculate admittance parameters.

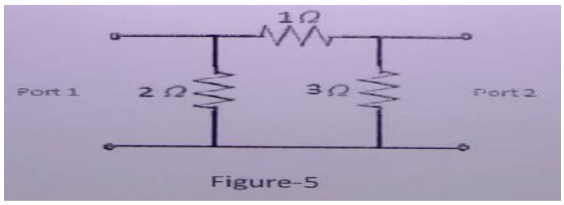

Figure-5

(b) The Z-parameters of a two- port network are Z11=15Ω, Z12=Z21=6Ω and Z22=24Ω. Determine ABCD parameters.

16. (a) Prove that two watt-meters are sufficient to measure power in three phase system.

(b) Three coils each having a resistance of 50 Ω and an inductive reactance of 45 Ω are connected in star and fed by a 3-phase, 400 V, 50 Hz system. Find

(i) Line current

(ii) Power

(iii) Power factor.

17. (a) Write the expression for total inductance of the three series connected coupled coils connected between A and B as shown in circuit shown in figure -6

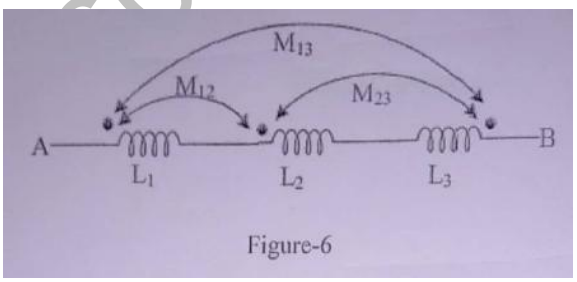

Figure-6

(b) Determine voltage V across a 15 ohms resistor in the magnetically coupled circuit shown in Figure 2. Take Vs = 30∠40 degrees.

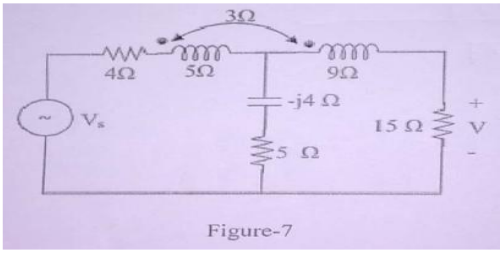

Figure-7

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Code No : 2536 / CBCS/BL

FACULTY OF ENGINEERING

BE III Semester (CBCS)(ECE) (Backlogs) Examination, October 2020

Subject: Signal Analysis and Transform Techniques

Time : 2 Hours **Max. Marks: 70**

PART – A

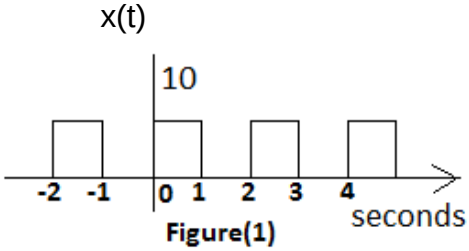
Note: Answer any five questions. **(5x2 = 10 Marks)**

1. Define power signal. Is the signal $x(t) = 10\, rect\,(\frac{t-10}{10})$ a power signal?
2. Write any two properties of the Fourier series co-efficients of a continuous time periodic signal.
3. Find the Fourier transform of the signal $x(t) = 5\, e^{-5|t|}$
4. Define Region of Convergence, ROC for the Laplace transform of a signal .Give an example.
5. State the following properties of Z- transforms:
   a) Time shifting property.
   b) Differentiation in Z-domain property
6. The unilateral Z-transform of a discrete signal is $X(z) = \frac{5z}{z-2}$. Find the final value and initial value of the signal x(n).
7. Write any two properties of auto- correlation function of a continuous time signal x(t).
8. Find y(n) = δ[n-1] $\otimes$ [u[n] – u(n-2)]
9. A discrete time system is characterized by the difference equation $y(n) = 2\, x\,[n]^2$. Test if the system is Causal and Time – invariant.
10. Write the formulas to find the discrete Fourier series and Fourier co-efficients for a discrete time periodic signal.

PART – B

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

11. Find the Trigonometric Fourier series of the periodic signal shown in figure (1).



Figure(1)

....2

12. a) A continuous time system is characterized by the transfer characteristic. $y(t) = 2\,x\,(t-1) + 5$. Test if the system is causal and linear time invariant.
    b) Derive the relation between Trigonometric and complex exponential Fourier Co-efficient.

13. a) State and prove the following properties of Fourier transforms.
    i) Time differentiation property.
    ii) Frequency shifting property.
    b) Find the region of convergence and Laplace transform for the signal. $x(t) = 2\,e^{-3t}$ u (t) + 4 e^{5t} u (-t).

14. a) Write the properties of Region of Convergence (ROC) for Z-transforms.
    b) If x[n] $\Leftrightarrow$ X (z) , find the z-transform of 2x[n-2] and 3n x[n]

15. a) Find the auto-correlation of the signal $x\,(t) = 2\,rect\left(\frac{t-4}{4}\right)$
    i.e x(t) = 2 ; 2 ≤ t ≤ 6
    = 0 elsewhere
    b) IF $x_1(t) = 2\,u(t)$ and $x_2(t) = 3\,e^{-4t}\,u(t)$ find $x_1(t) * x_2(t)$

16. a) Find the Fourier series of the discrete signal x[n] = 2 cos (4n) + 4cos (2n)
    b) Sketch the following signals :
    i) u[n] -u[n-3]
    ii) r[n] - r[n-4], r[n] represents discrete ramp signal.

17. Write technical notes on the following :
    a) Dirichlett's conditions for Fourier series of continuous time signals.
    b) Sifting properties of Impulse functions in continuous time and discrete time.
    c) Orthogonal functions and representation of a signal by a orthogonal functions.

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Code No. 2540/CBCS/BL

FACULTY OF ENGINEERING

B.E. III-Semester (CBCS) (M/P) (Backlog) Examination, Oct. 2020

Subject : Metallurgy and Material Science

Time : 2 hours **Max. Marks:70**

PART – A

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

1 What are the different imperfections in crystals?
2 What is the Hall-Petch equation?
3 Define 'fatigue'. Explain the factors effecting fatigue.
4 Give at least three applications of diffusion in mechanical engineering.
5 Explain Gibbs phase rule.
6 What is the classification of plain carbon steels?
7 What are the differences between hardening and tempering?
8 What is the purpose of heat treatment and how is it different from alloying?
9 State the characteristics of brass metal.
10 Write the effect of nickel on steel.

PART – B

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

11 a) Explain recovery, recrystallization, grain growth and their effect on mechanical properties of materials.
b) What is critical resolved shear stress? Explain.

12 a) What are the effects of metallurgical variables on fatigue of metal? Explain.
b) Explain the difference between creep curve and stress rupture curve.

13 a) Explain construction of phase diagram of iron and iron carbide system with neat diagram.
b) Classify plain carbon steels. Explain the effect of carbon on the properties of plain carbon steels.

14 a) Differentiate between annealing and normalizing.
b) Explain the need of tempering a hardened steel. Describe the process of tempering.

15 a) What are examples of polymers and where its used.
b) List out applications of composites.

16 a) Discuss various alloys of copper and their applications.
b) Explain T.T.T. curve with neat sketch.

17 Write short notes on the following:
a) Case Hardening
b) Maraging steels
c) Composties

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Code No.2545/CBCS/BL

FACULTY OF ENGINEERING

B. E. III – Semester (AE) (CBCS) (Backlog) Examination, October 2020

Subject: Thermal Engineering

Time : 2 hours **Max. Marks:70**

PART – A

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

1. State first law of thermodynamics in various forms.
2. Define Thermodynamic equilibrium.
3. Define Kelvin Plank statement of second law of thermodynamics.
4. Sketch P-V and T-S diagram of Carnot Cycle.
5. Differentiate between open and closed cycle gas turbine.
6. Define steady state fluid flow.
7. Define (i) Enthalpy of Fluid (ii) Latent Heat.
8. Draw the layout of simple vapour absorption system.
9. What are the advantages of multistage compression?
10. What are advantages of Hydrogen fuel?

PART – B

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

11. (a) Derive the expression of Work done and Heat supplied in adiabatic process.

    (b) 0.336m3 of gas at bar and 150˚C expands adiabatically, until its pressure is 4 bar. It is them compressed isothermally to its original volume. Find the final temperature and pressure of the gas. Also determine the change in internal energy. Take Cp = 0.996 kJ/kg K and Cv = 0.703 kJ/kgK.

12. (a) What is Clausius inequality? What is its significance?

    (b) What are the limitations of first law of thermodynamics?

13. Air enters the compressor of a gas turbine plant operating on Brayton cycle at 1 bar and 27˚C. The pressure ratio of the cycle is 6. Calculate the maximum temperature in the cycle and the cycle efficiency. Assume the turbine work as 2.5 times the compressor work. Take $\gamma = 1.4$.

14. (a) Explain reversed Carnot cycle.

    (b) The steam consumption of a steam engine is 20 tonnes per shift of 8 hrs when developing 220kW. Dry and saturated steam enters the engine at 10 bar pressure and leaves it at 0.1 bar pressure. Estimate the Rankine efficiency of the engine.

15. Derive the expression for minimum work done in 2-stage reciprocating air compressor with perfect inter cooling.

16. (a) What are objectives and advantages of Hybrid vehicles.

    (b) What are desirable properties of ideal refrigerants.

17. (a) Explain how inter cooling improves the Performance of Gas Turbine.

    (b) Define Entropy. Show that it is a property of the system.

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Code No. 2548/CBCS/BL

FACULTY OF ENGINEERING

B.E III-Semester (CBCS) (CSE) (Backlog) Examinations, October 2020

SUBJECT: Discrete Mathematics

Time: 2 Hours **Max Marks: 70**

PART – A

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

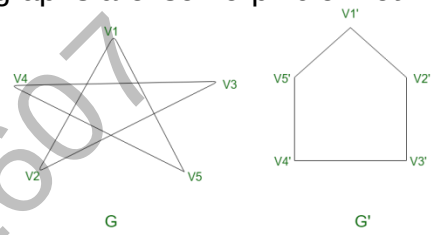
1 Construct truth table for ~(p v q)<-->(~p)^(~q)
2 Explain about converse ,inverse and contrapositive statements
3 Define inclusion-exclusion principle
4 What is derangement and write its representation
5 Define generating function
6 What is homogeneous recurrence relation ?
7 Define monoid and give an example for it
8 What is homomorphism ?
9 What is Hamilton path and circuit ?
10 Define spanning tree and give example.

PART – B

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

11 a) Define Algebraic structure and its properties
b) Explain about group codes and their applications

12 a) Check whether the following graphs are isomorphic or not



b) Explain the concept of prim's algorithm with an example to find MST.

13 a) Find the solution for recurrence relation $a_n=6a_{n-1}-11a_{n-2}+6a_{n-3}$ with initial conditions $a_0=2,a_1=5,a_2=15$
b) Explain about divide and conquer approach with example.

14 a) How many bit strings of length 8 either start with a 1 bit or end with 2 bits 00?
b) Define generalized pigeon-hole principle and show that in a group of 30 people we can select 5 people who have been born on same day of the week

15 a) Prove that [p --> (qvr)]<-->[(p^~q) --> r] is a tautology (5M)
b) Each user on a computer system has a password,which is 6 to 8 characters long where each character is an uppercase letter or a digit. Each password must contain atleast one digit.How many possible passwords are there?

16 Write Short notes on
a) POSET
b) Cartesian product and Equivalence relation
c) planar graph

17 Construct hasse diagram for {(1,2,3,4,6,8,12), |}

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Code No. 2554/CBCS/BL

FACULTY OF ENGINEERING

B.E. (IT) III-Semester (CBCS) (Backlog) Examination, October 2020

Subject : Discrete Mathematics

Time : 2 hours **Max. Marks : 70**

PART – A

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

1 Show that $\neg(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences.
2 Express the statement : "Every student in this class has visited either Mexico or Canada" using predicates and quantifiers.
3 Find f o g and g o f where f(x) = x^2 + 1, g(x) x + 2, are functions from R to R.
4 Let a, b and c be integers, where a ≠ 0, then prove that if a | b then a | bc for all integers c.
5 How many bit strings are there of length 6 or less, not counting empty strings?
6 A palindrome is a string whose reversal is identical to the string. How many bit strings of length n are palindromes?
7 What is the coefficient of x^{12} y^{13} in the expansion of $(2x - 3y)^{25}$?
8 What is the probability that when two dice are rolled, the sum of the numbers on the two dice is 7?
9 What is the value of following prefix expression : $* + 3 + 3 \uparrow 3 + 1\ 1\ 3$
10 Find coefficient of x^9 in $(x^2 + x^3 + x^4 + x^5 + x^6 + \ldots)^3$.

PART – B

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

11 a) Let F(x,y) be the statement "x can fool y", where the domain consists of all people in the world. Use quantifiers to express each of these statements.
i) Everybody can fool Fred
ii) Evelyn can fool everybody
iii) Everybody can fool somebody
iv) There is no one who can fool everybody
v) Everyone can be fooled by somebody
vi) No one can fool both Fred and Jerry

b) Determine whether each of these statements is true or false and write your justification for the same.
i) $0 \in \emptyset$ ii) $\emptyset \in \{0\}$ iii) $\{0\} \subset \emptyset$ iv) $\emptyset \subset \{0\}$

X

12 a) Use Chinese remainder theorem to find all solutions to the system of congruences $x \equiv 1 \pmod 2$, $x \equiv 2 \pmod 3$, $x \equiv 3 \pmod 5$, and $x \equiv 4 \pmod{11}$.
b) Give a big-O estimate for f(n) = 3n log(n!) + (n^2+3) log n, where n is a positive integer.

13 a) Use mathematical induction to prove the following where n is non-negative integer :

$$\sum_{j=0}^{n} ar^j = a + ar + ar^2 + \ldots + ar^n = \frac{ar^{n+1} - a}{r - 1} \quad \text{when } r \neq 1$$

b) Express GCD (252, 198) as a linear combination of 252 and 198.

14 a) How many positive integers less than 1000 are
i) are divisible by 7 ii) are divisible by 7 but not by 11
iii) are divisible by both 7 and 11 iv) are divisible by either 7 or 11
v) are divisible by exactly one of 7 and 11
vi) are divisible by neither 7 or 11

b) How many license plates can be made using either two uppercase English letters followed by four digits or two digits followed by four uppercase English letters?

15 a) State and prove the Euler's formula for Planar Graph.

b) Define a Minimum Spanning Tree (MST)? Write Prim's algorithm to find an MST. Obtain an MST for the graph shown in figure 1 using Prim's algorithm.

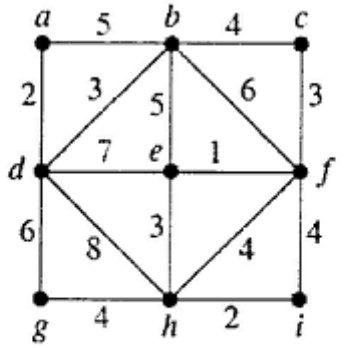

Figure 1: Weighted Undirected Graph

16 a) A solve these recurrence relation together with the initial conditions given as follows : $a_n = 5a_{n-1} - 6a_{n-2}$ for $n \geq 2$, $a_0 = 1$, $a_1 = 0$.

b) In how many different ways can eight identical cookies be distributed among three distinct children if each child receives at least two cookies and no more than four cookies?

17 a) Identify the properties that following relations on set {1, 2, 3, 4} holds :
R_1 = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 4), (4, 1), (4, 4)},
R_2 = {(1, 1), (1, 2), (2, 1)},
R_3 = {(1, 1), (1, 2), (1, 4), (2, 1), (2, 2), (3, 3), (4, 1) (4, 4)}.

b) Determine if the graph given in figure 2 contains Euler Circuit or Euler Path, if so list such a circuit or path.

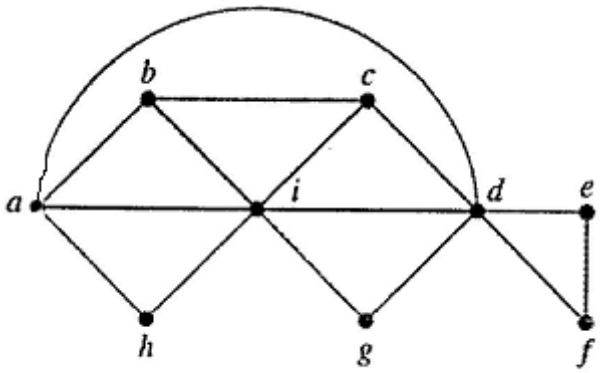

Figure 2: A connected undirected graph

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