MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)

Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019

Subject: **Probability & Statistics**

Branch: **CE**

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

PART – A

I.   Answer **ALL** questions of the following   **5x1Mark=5 Marks**

1. Define markov chain.
2. Define steady states.
3. Write difference between Population and Sample.
4. Write rank correlation formula for repeated ranks.
5. Define a Discrete Random Variable.

II.   Answer **ALL** questions of the following   **10x2Marks=20 Marks**

1. If X and Y are two discrete random variables, then prove that $E(X+Y) = E(X) + E(Y)$ provided E(X) E(Y) exist.
2. If X is a random variable, and A and B are constants, then prove that $E(AX+B)= A\ E(X)+B$, where E(X) is expected value of X.
3. Define Joint Probability mass function.
4. Write the formula for covariance between two continuous random variables.
5. What do you mean by critical region and acceptance region?
6. Describe the Procedure involved in Testing of hypothesis.
7. Define Pure Birth and Death process.
8. If average number arrivals is 4 per hour and average number of services is 6 per hour then find the probability that a new arrival need not wait for the service.
9. Is the matrix $\begin{bmatrix} \frac{1}{2} & -\frac{1}{2} \\ \frac{1}{4} & \frac{3}{4} \end{bmatrix}$ stochastic?
10. Write the Markovian algorithm

PART-B

Answer **ALL** questions of the following   **5x10 Marks= 50Marks**

1. In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution.

OR

2. Given that $P(X = 2) = 45\ P(X = 6)-3\ P(X = 4)$ for Poisson variate X, find the probability that
   a) $X \le 2$, b) $X \ge 3$, c) $3 < X \le 5$ and d) Verify whether mean and variance of the Poisson distributions are equal.

3. Calculate Karl Pearson's correlation coefficient for the following paired data. What inference would you draw from the estimate?

X	28	41	40	38	35	33	40	32	36	33
Y	23	34	33	34	30	26	28	31	36	38

OR

4. Given bi-variate data

x	1	5	3	2	1	1	7	3
y	6	1	0	0	1	2	1	5

    a) Find the regression line y on x and hence predict y when x= 10.

    b) Find the regression line x on y and hence predict y when y= 2.5.

5. The means of simple samples of sizes 1000 and 2000 are 67.5 and 68.0 cm respectively. Can the samples be regarded as drawn from the same population of S.D.2.5 cm

OR

6. A group of 5 patients treated with medicine A weight 42, 39, 48, 60 and 41 kgs. Second group of 7 patients from the same hospital treated with medicine B weight 38, 42, 56, 64, 68. 69 and 62 kgs. Do you agree with the claim that medicine B increases the weight significantly?

7. Barber A takes 15 minutes to complete a haircut. Customers arrive in his shop at an average rate of one every 30 minutes. Barber B takes 25 minutes to complete one haircut and customers arrive at his shop at an average rate of one every 50 minutes. The arrival processes are Poisson and the service times follow an exponential distribution. a) Where would you expect a bigger queue. b) Where would you require more time waiting included to complete a haircut?

OR

8. Consider a single server queueing system with poisson input and exponential service time. Suppose the mean arrival rate is 3 calling units per hour with the expected service time as 0.25 hours and the maximum possible number of calling units in the system is 2.Obtain the steady state probability distribution of the number of calling units in the system and then calculate the expected number in the system.

9. A man either drives a car or catches a train to go to office each day. He never goes 2 days in a row by train but if he drives one day, then the next day he is just as likely to drive again as he is to travel by train. Now suppose that on the first day of the week, the men tossed a fair dice and drove to work if and only if a 6 appeared. Find (i) the probability that he takes a train on the third day and (ii) the probability that he drives to work in the long run.

OR

10. a) Define stochastic Process, Markov Process and give examples?

    b) Define Poisson Process and what are the postulates of Poisson Process.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019

Subject: <u>Strength of Materials - II</u>

Branch: CE

Time: 3 hours

Max. Marks: 75

PART – A

I.   Answer **ALL** questions of the following   **5x1Mark=5 Marks**

  1. Define theory of pure torsion?

  2. Difference between buckling factor and slenderness ratio

  3. What are stresses produces by eccentric loading?

  4. What is radial pressure in thick cylinders

  5. What is shear centre?

II.   Answer **ALL** questions of the following   **10x2Marks=20 Marks**

  1. Give any two uses of leaf spring.

  2. What are the conditions for replacing the solid shaft by a hollow shaft of different materials

  3. Write the limitations of Rankine's formula

  4. Explain Rankine's hypothesis for columns.

  5. Explain middle fourth rule

  6. What way beam curved in plan different from arches?

  7. Difference between thin and thick cylinders

  8. Write the expressions for change in length and change in diameter of thin cylinders.

  9. Define the product inertia.

  10. Locate the shear centre of angle and T section.

PART-B

Answer **ALL** questions of the following   **5x10 Marks= 50Marks**

1. Derive the torsion equation? $\frac{T}{J} = \frac{q}{r} = \frac{G\theta}{l}$ based on assumption made in pure torsion?

OR

2. The solid of a closely coiled helical spring is 160 mm and gap between two coils is 2mm. The mean diameter is 12 times diameter of the wire. Calculate the diameter of the wire, if the shear stress is limited to 120 N/mm^2 and maximum deflection is 120mm under an axial load 500 N. Take C=0.8x10^5 N/mm^2. Also calculate shear stress.

3. Find an expression for crippling load when one end of the column fixed and other end free.

OR

4. A beam column of hollow section 250mmx450mm outer dimensions and 25 mm thick is 6m long, carries a UDL 10kN/m and an axial load 200kN. Calculate the maximum bending stress and deflection. Take E = 2x10^5 N/mm^2.

5. A rectangular column of width 120 mm and of thickness 100 mm carries a point load of 120 kN at an eccentricity of 10 mm. Determine the maximum and minimum stresses at the base of the column.

<div align="center">OR</div>

6. A masonry retaining wall of trapezoidal section is 10m high and retains earth which is level upto the top. The width of the top is 2m and at the bottom is 8m and exposed face is vertical. Find the maximum and minimum intensities of normal stress at the base.

7. In a thick cylinder with internal pressure of 6 MPa, the circumferential stress at the outside surface is 20 MPa. Calculate the circumferential stress at the inside surface and at point where the radial stress is 3 MPa. Find out the longitudinal stress if the cylinder is closed at the ends and the inside diameter is 200 mm.

<div align="center">OR</div>

8. A thin cylindrical shell 3 m long has 1m internal diameter and 15 mm metal thickness. Calculate the circumferential and longitudinal stresses induced and also the change in the dimensions of the shell, if it is subjected to an internal pressure of 1.5 N/mm^2 Take $E = 2 \times 10^5$ N/mm^2 and poison's ratio =0.3. Also calculate change in volume.

9. Locate the shear centre for a channel section 250mmx100mmx10mm.

<div align="center">OR</div>

10. A cantilever beam of channel section, web 300mm X 10mm and flanges 100mm X 10mm, 3m long carries a point load 20KN at free end. Locate the neutral axis and calculate maximum bending stress and deflection.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019
Subject: **Structural Analysis -I**
Branch: CE

Time: 3 hours   Max. Marks: 75

PART – A

I.   Answer **ALL** questions of the following   **5x1Mark=5 Marks**
1. Write the significance of tension coefficient method.
2. What is advantage of an arch over beam?
3. What is an encastred beam?
4. Write the general slope deflection equations of a continuous beam.
5. Define Influence line diagram with their advantage.

II.   Answer **ALL** questions of the following   **10x2Marks=20 Marks**
1.   Define kinematic in determinacy of a structure with a suitable example.
2.   Find out the forces in the members AC & BC of the truss shown below,
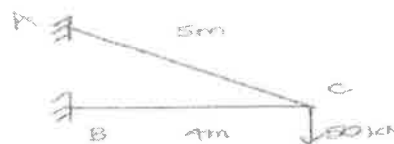

3.   What is the difference between 3 hinged arch and 2 hinged arch?
4.   State the Eddy's theorem of three hinged arches.
5.   How is the prop reaction determined and explain?
6.   In a fixed beam of 4 m span carrying a central load of 10 kN, what is the fixed end moment developed.
7.   What is the effect of sinking of a fixed support in a fixed beam and write down the expression for sinking support?
8.   Using moment distribution method, draw BMD for the beam shown.


9.   Draw Influence lines for support reactions in a simply supported beam?
10.   Draw the influence line for a s/s beam of 6m span for reactions at left and right supports.

PART-B

Answer **ALL** questions of the following   **5x10 Marks= 50Marks**
1. Analyze the cantilever plane truss shown in figure below and find the member forces. Using the method of tension coefficients.
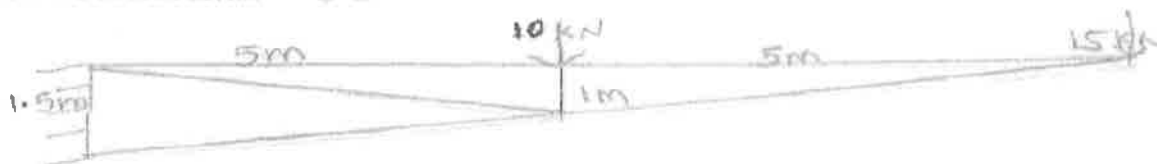

OR

2. Using the method of tension coefficients Analyze the cantilever plane truss shown in figure. and find the member forces.
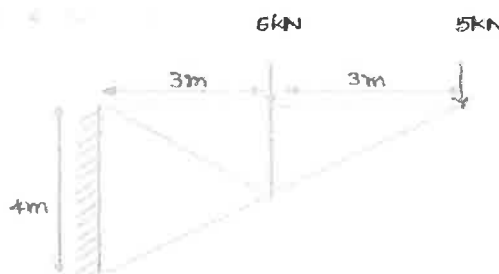
3. Using Castigliano's I theorem find the slope and deflection at the free end of a cantilever of span L, due to a point W at the free end.

OR

4. Determine the horizontal deflection at c of the truss loaded as shown in figure using strain energy method. All members have same cross sectional area of 1500 sq.mm and E = 200GPa.
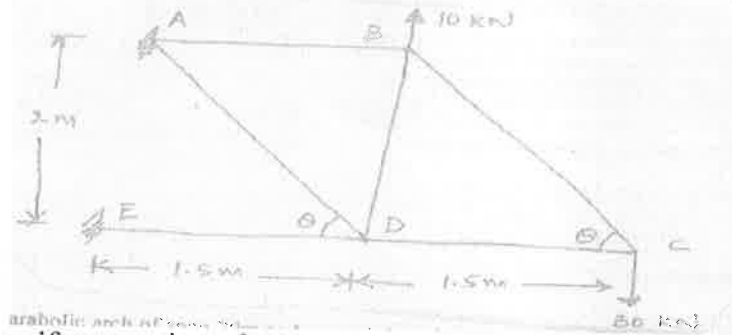
5. A fixed beam AB of uniform section of span 6 m. The beam subjected a uniformly distributed load of 15 kN/m over its entire span and a point load of 30 kN at mid span. Determine the fixed end moments at the ends and the reaction. Draw BMD and SFD. Determine deflection under the point load.

OR

6. A fixed beam of span 6 m carries a u.d.l. of 10kN/m are the left half of span and a point load of 30kN at 1 m from the right end. Obtain the FEMs and reactions. Sketch the S.F. and B.M diagrams marking the values at salient points.

7. Analyse the continuous beam as shown figure below using slope deflection method.
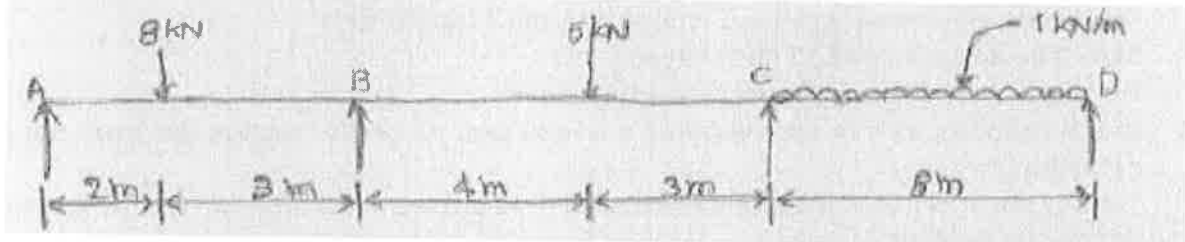
OR

8. A continuous beam ABC covers two consecutive spans AB and BC of length 5 m and 6 m, carrying loads of 10 kN/m and 15 kN/m respectively. If the ends A and B are simply supported, find the support reactions at A, B and C. Use Moment distribution method. Draw the shear force and bending moment diagram.

9. A system of four loads 80, 160, 160 and 120 kN crosses a simply supported beam of span 25 m with 120 kN load leading. The loads are equally spaced at 1m. Determine the values of the following using influence lines:
   i) Maximum bending moment at a section 10 m from left support and
   ii) Absolute maximum shear force and bending moment in the beam.

OR

10. Two point loads of 100kN and 200kN spared 3m apart cross a girder of span 15m from left to right with the 100kN load loading. Draw the influence lines for shear force and bending moment and find the value of maximum shear force and bending moment at a secton D, 6m from the left hand support. Also, find the absolute maximum bending moment due to the given load system.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019

Subject: **Basic Electrical and Electronics Engineering**

Branch: **Common to CE & MINING**

Time: 3 hours   Max. Marks: 75

PART – A

I.   Answer **ALL** questions of the following   **5x1Mark=5 Marks**
1. Define the magnetic flux density
2. Define Ohms law
3. What is synchronous speed?
4. Define cut-in voltage for a diode.
5. Define sensitivity for a CRO.

II.   Answer **ALL** questions of the following   **10x2Marks=20 Marks**

1. Two 1.2 k Ω resistors are in series and this series combination is in parallel with a 3.3 k Ω resistor. Find the total resistance?
2. Two resistors with 50 ohms resistance are connected in parallel to a voltage source of 50 volts, find current in each resistor.
3. Write the operating principle of Transformer.
4. Define transformation ratio and write down the equations of it.
5. State Fleming's Left and Right Hand Rules.
6. What is significance of Back EMF in a Dc machine?
7. What is approximate diode voltage drop?
8. Define drift current and diffusion current
9. How to measure frequency using CRO?
10. Explain the intensity control in CRO

PART-B
Answer **ALL** questions of the following   **5x10 Marks= 50Marks**
   1. Find the current **I** in the circuit shown below
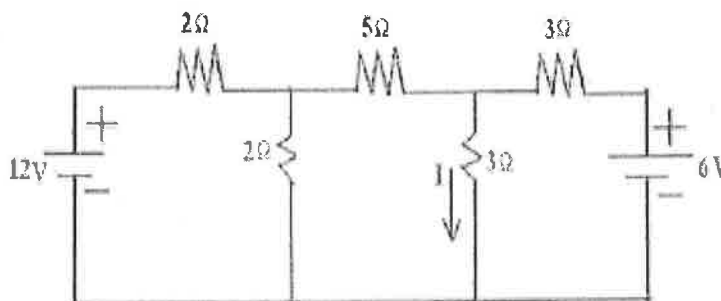
OR

   2. Find the resistance between the terminals A and B for the network shown in Fig.
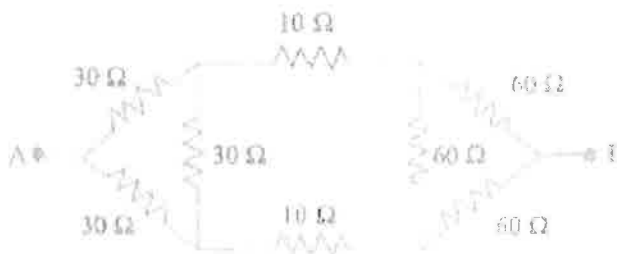
3. Explain OC tests of transformer with neat circuit diagram.

OR

4. a) Write the advantages of transformer tests.

   b) Write and explain about hysteresis and eddy current losses.

5. Determine developed torque and shaft torque of 220V,4-pole series motor with 800 conductors wave connected supplying a load of 8.2KW by taking 45A from the mains, the flux per pole is 25mWb and its armature circuit resistance is 0.6 Ohm.

OR

6. A DC motor is connected to a 460V supply takes an armature current of 120A on full load. If the armature has resistance of 0.25 Ohm, calculate back emf.

7. Explain the V-I characteristics of Diode?

OR

8. Explain working of diode and transistor along with VI characteristics

9. Explain the construction and working of a Wein bridge Oscillator.

OR

10. a) Explain the principle and operation of an oscillator.

    b) Write short notes about the essentials of transistor oscillator.

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II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2019

Subject: **Hydraulics & Hydraulic Machinery**

Branch: CE

Time: 3 hours

Max. Marks: 75

PART – A

I. Answer all the questions

5 X 1 = 5 Marks

1. What do you understand by Flow in open Channel
2. What do you mean by fundamental units and derived units? Give examples.
3. Define the terms impacts of jets and Jet propulsion
4. Define the terms hydraulics machines and turbines.
5. Define a centrifugal pump. Draw a neat sketch of a single – stage centrifugal pump.

II. Answer all the questions

10 X 2 = 20 Marks

1. Define the tem most economical section of a channel. What are the conditions for the rectangular channel of the best section?
2. Explain the terms slope of the bed, hydraulic mean depth and wetted perimeter
3. What are the methods of dimensional analysis?
4. Describe the Rayleigh's method for dimensional analysis.
5. Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet.
6. Show that the force exerted by a jet of water on an inclined fixed plate in the direction of the jet is given by, $F_x = \rho a V^2 \sin^2\theta$ where a= Area of the jet, V = Velocity of the jet, θ = Inclination of the plate with the jet.
7. What do you mean by gross head, net head and efficiency of turbine? Explain the different types of the efficiency of a turbine.
8. Differentiate between (a) The Impulse and reaction turbines, (b) Radial and axial flow turbines.
9. Differentiate between the volute casing and vortex casing for the centrifugal pump.
10. What do you mean by manometric efficiency, mechanical efficiency and overall efficiency of a centrifugal pump?

PART B

Answer all the questions

5 X10 = 50 Marks

1. (a) Prove that for a channel of circular section, the depth of flow, d= 0.81 D for maximum velocity and d= 0.95 D for maximum discharge, where D = Diameter of circular channel, d= depth of flow.

   (b) Find the velocity of flow and rate of flow of water through a rectangular channel of 5 m wide and 2 m deep, when it is running full. The channel is having bed slope of 1 in 3000. Take Chezy's constant C=50.

(OR)

2. Derive an expression for the variation of depth along the length of the bed of the channel for gradually varied flow in an open channel. State clearly all the assumptions made.

3. (a) what is meant by geometric, kinematic and dynamic similarities? Are these similarities truly attainable? If not why?

   (b) Define and explain: (i) Froude's number (ii) Mach number (iii) Hydraulic similarities (iv) Distorted and undistorted models

(OR)

4. The resistance R, to the motion of a completely sub-merged body depends upon the length of the body L, velocity of flow V, mass density of fluid ρ and kinematic viscosity of fluid ϑ.

   By dimensional analysis prove that $R = \rho V^2 L^2 \Phi \left(\frac{VL}{\vartheta}\right)$

5. Show that for a curved radial vane, the work done per second is given by $\rho a V_1$
   $[Vw_1 u_1 \pm Vw_2 u_2]$.

(OR)

6. A jet of water of diameter 100 mm strikes a curved plate at its centre with a velocity of 15 m/s. The curved plate is moving with a velocity of 7 m/s in the direction of the jet. The jet is deflected through an angle of 150°. Assuming the plate smooth find: (i) force exerted on the plate in the direction of the jet, (ii) power of the jet, and (iii) efficiency

7. Obtain an expression for the work done per second by water on the runner of a pelton wheel. Hence derive an expression for maximum efficiency of the pelton wheel giving the relationship between the jet speed and bucket speed. Draw inlet and outlet velocity triangles for a pelton turbine and indicate the direction of various velocities.

(OR)

8. An inward flow reaction turbine has external and internal diameters as 1.2 m and 0.6 m respectively. The velocity of flow through the runner is constant and is equal to 1.8 m/s. Determine: (i) Discharge through the runner, and (ii) Width at outlet if the width at inlet = 200mm.

9. (a) what is cavitation and what are its causes? How will you prevent the cavitation in hydraulic machines?

   (b) What is cavitation? State its effects on the performance of water turbines and also state how to prevent cavitation in water turbines.

(OR)

10. A centrifugal pump is running at 1000 r.p.m. The outlet vane angle of the impeller is 30° and velocity of flow at outlet is 3 m/s. The pump is working against a total head of 30 m and the discharge through the pump is 0.3 m³/s. if the manometric efficiency of the pump is 75%, determine: (i) the diameter of the impeller, and (ii) the width of the impeller at outlet.