Code No.: 30307/40309

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 I SEMESTER SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Metallurgy and Material Science**

Branch: ME

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

PART – A

I. Answer ALL questions of the following   **5x1Mark=5 Marks**
1. Give examples of BCC, FCC crystal structures
2. Define lever rule
3. Give the applications of grey cast iron
4. Define age hardening
5. Give the names of different types of glass fibers with applications

II. Answer ALL questions of the following   **10x2Mark=20 Marks**
1. Effect of grein boundaries on the mechanical properties of metals
2. Define intertial solid solution
3. What is the use of TTT diagram
4. What is the composition and applications of white cast iron
5. What is the purpose of hardening of steel
6. Effect of alloying elements of iron carbide diagram
7. Explain induction hardening
8. What are the applications of bronze
9. Properties of applications of cermeats
10. Explain types of metal matrix composites

PART-B

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

Q1. What are the different types of bonding systems in solids?

(OR)

Q2. Explain hume rothery rule for the formation of substitutional solid solution

Q3. Explain the following with examples (a) Eutectic system (b) Peritectic system

(OR)

Q4. Explain with the neat sketch iron- iron carbon diagram

Q5. Give the properties and uses of various types of cast iron

(OR)

Q6. Give typical composition and uses of the various types of steels

Q7. Explain with examples and properties of copper alloys

(OR)

Q8. Distinguish between (a) Annealing and normalizing (b) Hardness and harden ability (c) Astempering and martemperating

Q9. What is meant by composite give the advantages and applications of composites

(OR)

Q10 Explain briefly the following abrasives (a) Silicon carbide (b) Aluminum oxide

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: <u>Thermodynamics</u>

Branch: **ME**

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

PART – A

I. Answer ALL questions of the following   **5x1Mark=5 Marks**
  1. What is meant by surrounding?
  2. What is meant by PMM1?
  3. Explain about isobaric process.
  4. Define the term Compression Ratio.
  5. Discuss about work of compression in a refrigerator.

II. Answer ALL questions of the following   **10x2Mark=20 Marks**
  1. What is thermodynamic property? Explain Intensive and Extensive properties with examples.
  2. Define COP. What is the relation between COP of Heat Pump and Refrigerator?
  3. State Carnot's Theorem.
  4. Define Third law of Thermodynamics.
  5. Define Throttling process.
  6. What is Enthalpy? Write down its formula
  7. A mass of 5 kf of saturated water vapor at 300 kPa is heated at constant pressure until the temperature reaches 200°C. Calculate the work done by the steam during this process.
  8. Discuss about air standard cycles.
  9. Draw the line diagram for vapor compression refrigeration cycle.
  10. Define Dew point temperature.

PART-B

Answer ALL questions of the following   **5x10 Marks= 50Marks**
  1. a) Define entropy and irreversibility.   **4M**
     b) A 50kg copper block initially at 80°C is dropped into an insulated tank that contains 120litre of water at 25°C. Determine, (i) the final equilibrium temperature, and (ii) the total entropy change for this process   **6M**

OR

  2. a) Explain Boeyl's law with PV diagram
     b) Explain about Constant volume gas thermometer with a neat sketch?

  3. a) Briefly explain about Joules experiment with a neat sketch.
     b) Explain about Clausius Inequality.

OR

  4. a) Explain Carnot cycle for Refrigeration system with neat diagram?
     b) A heat pump working on reversed Carnot cycle takes in energy from a sink at 5°C and delivers a source at 75°C. The heat pump drives its power from a Carnot engine working between a temperature range of 1000°C and 75°C. If the heat delivered by the heat pump is 2500 kJ/min. to the source at 75°C, find the energy supplied to the Carnot engine from the source at 1000°C

5. a) What is compressibility factor ? Explain the basic construction of generalized compressibility chart.

   b) Determine the specific volume of methane gas at 100 bar and 250K using i) ideal gas equation and ii) the compressibility factor. Assume Z= 0.68 for methane and R=0.5182 KJ/Kg K.

OR

6. Explain about Work done and Heat Transfer of Adiabatic process in Thermodynamic System.

7. a) Describe Otto cycle with the help of PV and TS diagram.

   b) An engine operating on the ideal Otto cycle has a compression ratio of 8:1.At the beginning of the compression stroke the air is at 103.5 KN/m² and 300K. If the heat supplied is 920kJ/kg of air, calculate the maximum pressure and temperature in the cycle and the efficiency. Assume Cv= 0.718kJ/kg K and γ =1.4.

OR

8. An air standard diesel cycle has a compression ratio of 16 and the heat transferred to the working fluid per cycle is 1500 KJ/Kg. At the beginning of the compression process, the pressure is 0.05 MPa and the temperature is 27°C. Determine. i) the pressure and temperature at each point in the cycle ii) the thermal efficiency iii) the mean effective pressure of the cycle.

9. a) What are the basic components of Vapour compression system? State their functions.

   b) Dry bulb and wet bulb temperature of latmosphere air stream are 40°C and 30°C respectively. Determine i) Humidity ii) Relative humidity iii) specific humidity iv) Dew point Temperature.

OR

10. a) Explain VCR cycle with neat diagram?

    b) A VCR plant maintains -10°C in the evaporator using F₁₂ as refrigerant. The condition of vapor at the suction of compressor is dry and saturated. The condensation of vapor takes place at 50°C. Assuming there is no sub-cooling find (a) C.O.P. of the cycle. (b) If the load on the evaporator is 20 tones of refrigeration, find the theoretical HP required to run the plant.

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: **Mechanics of Solids**

Branch: ME

Time: 3 hours   Max. Marks: 75

PART – A

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

1. Define the term Poisson's ratio
2. What do you mean by shear force and bending moment?
3. Product of EI=-----------------------------------
4. Write the differential equation for the elastic line of a beam.
5. How do you distinguish between thin and thick pressure shells?

II. Answer ALL questions of the following   10x2Mark=20 Marks

1. Derive the formula for the elongation of a circular rod under the action of axial load.
2. Explain about resilience and modulus of resilience.
3. Define the point of contraflexure and what is its significance?
4. What are the main types of supports? Distinguish between roller and hinged supports.
5. Explain the limitations of flexure equation.
6. Sketch the shear stress distribution of rectangular section
7. What is Macaulay's method of beam deflection analysis? What are its advantages over the direct integration method?
8. State any three assumptions made in the theory of simple torsion.
9. Explain the method of joints to analysis a frame and its limitations.
10. Calculate the longitudinal stress and hoop stress for a cylindrical pipe of diameter 2.5m and thickness 20mm is subjected to an internal fluid pressure of 1.5 MPa.

PART-B

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

1. Prove that Poisson's ratio for the material of a body is 0.5, if its volume does not change when stressed. Prove also that Poisson's ratio is zero when there is no lateral deformation when a member is axially stressed.

OR

2. A steel rope lowers a load of 10KN with a uniform velocity of 800mm/s, when the length of the rope unwound is 10m, if suddenly gets jammed and the load is brought to a halt. Determine the stress developed in the rope due to sudden stoppage and the maximum instantaneous elongation if the diameter of the rope is 18mm. Take E_s= 210 GPa

3. Draw the SFD and BMD for a beam supported and loaded as shown in figure 1. Locate the points of contraflexure.
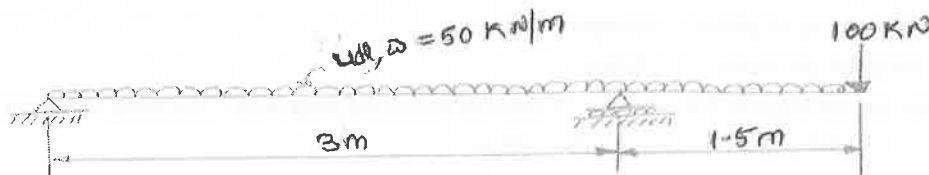

Figure 1

OR

4. a) How do you classify loads? Give examples

   b) A simply supported beam of length 5 m carries a uniformly increasing load of 800 N/m run at one end to 1600 N/m run at the other end. Draw the SF and BM diagrams for the beam

5. a) Derive the bending equation from first principle.

   b) A simply supported beam AB of span length 4 m supports a uniformly distributed load of intensity q = 4 KN/m spread over the entire span and a concentrated load P = 2KN placed at a distance of 1.5 m from left end A. The beam is constructed of a rectangular cross-section with width b = 100mm and depth d = 200mm. Determine the maximum tensile and compressive stresses developed in the beam due to bending.

OR

6. A beam of I section 400 mm x 180 mm has a web and flange thickness 20 mm. Calculate the maximum intensity of shear stress across the section and sketch the shear stress distribution across the section of the beam, it carries a shearing force of 300KN at a section.

7. For the SSB with the loading shown in figure 2, determine the deflection curve, maximum deflection and the maximum bending stress. The beam has a 250 mm width and 100 mm height and the modulus of elasticity is 200GPa.
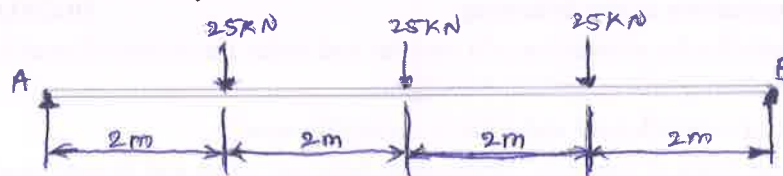

Figure 2

OR

8. A hollow shaft with diameter ratio 3/5 is required to transmit 450 KW at 120 rpm with uniform twisting moment. The shear stress in the shaft must not exceed 60 MPa and the twist in a length of 2.5 m must not exceed one degree. Calculate the maximum external diameter of the shaft satisfying these conditions. Take the modulus of rigidity, G = 80 GPa.

9. Determine the forces in all the members of the truss as shown in figure 3.
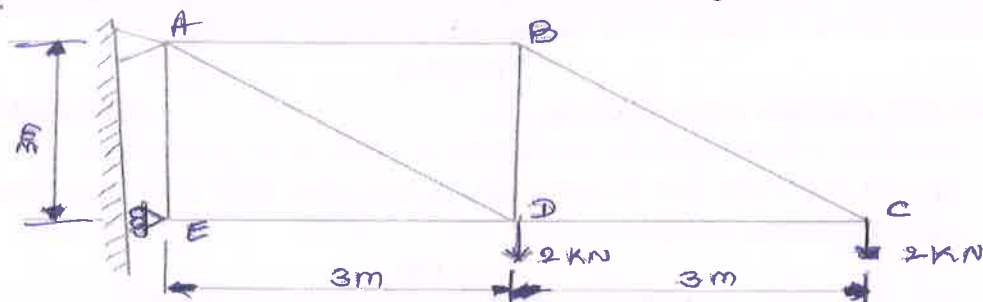

Figure 3

OR

10. A cylindrical shell has the following dimensions:

    Length = 3 m

    Inside diameter = 1 m

    Thickness of metal = 10 mm

    Internal pressure = 1.5 MPa

Calculate the change in dimensions of the shell and the maximum intensity of shear stress induced.

Take E = 200 GPa and Poisson's ratio = 0.3

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: <u>Machine Drawing</u>

Branch: ME

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

PART – A

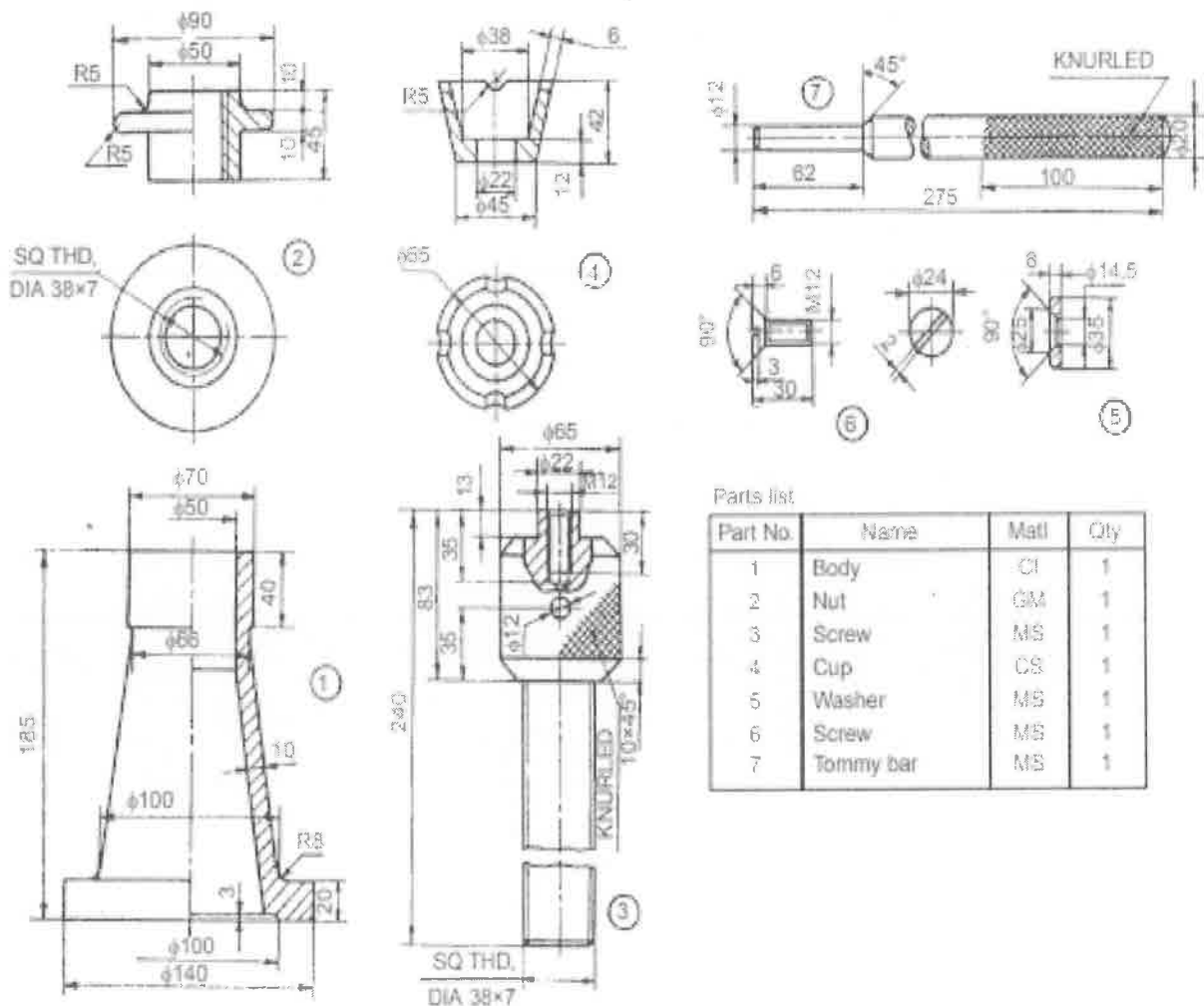**Answer any TWO questions of the following**   **2x15Marks=30 Marks**

1. Draw two views of a universal coupling, indicating proportions to connect two shafts, each of diameters 40mm.
2. Sketch half sectional elevation of a bush type footstep bearing assembly suitable to a shaft size 50 mm in diameter.
3. Two square rods of side 50 mm each are connected by a cotter joint with a gib. Draw the half sectional view from the front of the assembly.

PART-B

Answer the following question   **1x45 Marks= 45Marks**

1. Assemble different parts of Screw jack and draw the following views for the assembled unit.
   a) View from the front, right half in section and b) Top view   (25 M + 20 M)

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Nut	GM	1
3	Screw	MS	1
4	Cup	CS	1
5	Washer	MS	1
6	Screw	MS	1
7	Tommy bar	MS	1

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018

Subject: **Probability and Statistics**

Branch: **Common to ME, CSE, MINING & IT**

Time: 3 hours

Max. Marks: 75

PART – A

I. Answer ALL questions of the following

5x1Mark=5 Marks

1. Define Variance of continous probability distribution

2. Define Regression Coefficients.

3. Define one-tailed and two-tailed tests

4. What is queue discipline?

5. What is transition probability?

II. Answer ALL questions of the following

10x2Mark=20 Marks

1. Derive mean of Binomial distribution.

2. Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents are i) at least one ii) at most one

3. Define Correlation. Classify the types of correlation.

4. Is the data, regression coefficient Y on X is 0.7 and that of X on Y is 3.2 correct? If not justify your answer.

5. What do you mean by critical region and acceptance region?

6. What is the size of the smallest sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 95% confidence.

7. Explain about types of customer behavior in queueing process.

8. Write the relations between L_s, W_q in (M/M/1) : (N/FIFO) model..

9. Consider markov chain $\begin{bmatrix} \frac{3}{4} & \frac{1}{4} & 0 \\ \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ 0 & \frac{3}{4} & \frac{1}{4} \end{bmatrix}$

10. Find the periodic and a periodic states in the transition probability matrix $\begin{bmatrix} \frac{1}{4} & \frac{3}{4} \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$

1. Using recurrence relation between the probabilities find the probabilities when x= 0, 1,2,3,4 and 5 if the mean of the Poisson distribution is 3.

OR

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

3. Three judges A, B and C gave the following ranks. Find which pair of judges has common approach

A	1	6	5	10	3	2	4	9	7	8
B	3	5	8	4	7	10	2	1	6	9
C	6	4	9	8	1	2	3	10	5	7

OR

4. Heights of fathers and sons are given in the inches:

Height of father	65	66	67	67	68	69	71	73
Height of son	67	68	64	68	72	70	69	70

   Form the two lines of regression and calculate expected average height of the son when the height of the father is 67.5 inches.

5. A coin was tossed 400 times and returned heads 216 times .Test the hypothesis that the coin is unbiased. Use 0.05 level of significance.

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. Cars arrive in pollution testing centre according to Poisson distribution at an average rate of 15 cars per hour. The testing centre can accommodate at maximum 15 cars. The service time per ear is an exponential distribution with mean rate 10 per hr.
   a) Find the effective arrival rate at the pollution testing centre.   [3M]
   b) What is the probability that an arriving car has not to wait for testing.   [3M]
   c) What is the probability that an arriving car will find a vacant place in the testing centre. [3M]
   d) What is the expected waiting time until a car is left from the testing centre.   [2M]

OR

8. Cars arrive at a petrol pump with exponential interval times having mean half minute. The attendant takes an average of $\frac{1}{5}$ minute per car to supply petrol, the service time being exponentially distributed. Find   (a) The average number of cars waiting to be served. (b) The average number of cars in the system. (c) The proportion of time for which the pump attendant is idle.

9. a) Define stochastic Process, Markov Process and give examples?
   b) Define Poisson Process and what are the postulates of Poisson Process.

OR

10. A gambler has Rs2. He bets Rs1 at a time and wins Rs 1 with the probability 1/2. He stops playing if loses Rs 2 or wins Rs 4 . (a)What the tmp of the related markov chain? (b) What is the probability that he has lost his money at the end of5 plays? (c) What is the probability that the game lasts more than 7 days?

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Basic Electrical and Electronics Engineering**

Branch: **Common to ME & CSE**

Time: 3 hours

Max. Marks: 75

PART – A

I. Answer ALL questions of the following

5x1Mark=5 Marks

1. Describe various types of electrical sources?
2. State Lenz's law.
3. Write a simple difference between shunt and series motors.
4. Define reverse saturation current in a diode.
5. What is meant by an oscillator?

II. Answer ALL questions of the following

10x2Mark=20 Marks

1. When three capacitors of 3 µF are connected in parallel and that combination is connected to 9 µF in series. What is its equivalent capacitance?
2. State maximum power transfer theorem.
3. Write any three analogies between electric circuits and magnetic circuits.
4. Distinguish between step-up and step-down transformer.
5. Define slip and synchronous speed.
6. Write the relation between armature current, field current and line currents in motor and generator.
7. Draw the V-I characteristics of SCR.
8. What is Ripple factor and specify its value for HWR and FWR.
9. List out the components of CRT.
10. Write the applications of CRO.

PART-B

Answer ALL questions of the following

5x10 Marks= 50Marks

1. Derive the relation between star and delta transformations in detail.

(OR)

2. a) Distinguish between statically induced and dynamically induced EMF's.
   b) Write the analogy between Thevenin's and Norton's theorem.

3. Explain the construction details of a transformer. Also derive its EMF equation.

(OR)

4. a) Explain different losses in a transformer.
   b) Write the properties of an Ideal transformer.

5. Define various types of torques in a DC motor and develop the expression for armature torque in a DC motor.

(OR)

6. a) Explain the principle of operation of three phase induction motor.

b) A3-phase, 4pole, 50 Hz induction motor operates with 415 V supply and rotor rotates at a speed of 1480rpm. Find the synchronous speed, relative speed, slip and rotor frequency.

7. a) Discuss the V-I characteristics of a PN junction diode.

b) Write the basic difference between PNP and NPN transistors.

(OR)

8. Draw the Bridge Rectifier, Explain its operation and Find the Ripple factor

9. a) Distinguish between Electro static deflection and magnetic deflection system.

b) Explain voltage and frequency measurements on a CRO with an example.

(OR)

10. Explain the working of RC phase shift oscillator using a transistor with a neat circuit diagram. Also give the expression for frequency of oscillations.