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, EXAMINATIONS,

DECEMBER-2018

Subject: __THERMODYNAMICS__

Branch: ME

Time: 3 hours   Max. Marks: 75

PART – A

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

1. Differentiate Point function and Path function.
2. What is the second law of Thermodynamics?
3. For an ideal gas draw the constant volume and constant pressure lines on T-S diagram.
4. State Dalton's law of partial pressure.
5. How are dry bulb, wet bulb and dew point temperatures related for saturated air?

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/m^2 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 F_{12} 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 (i) C.O.P. of the cycle.

    (ii) 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, NOVEMBER-2018

Subject: **PROBABILITY & STATISTICS**

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

Time: 3 hours

Max. Marks: 75

PART – A

I. Answer ALL questions of the following

5x1Mark=5 Marks

1. Define discrete and continuous random variable.
2. Define correlation coefficients.
3. Write the finite population correction factor.
4. Define Poisson distribution
5. Write conditions for periodic matrix.

II. Answer ALL questions of the following

10x2Mark=20 Marks

1. 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.
2. What are the conditions under which Poisson distribution is a limiting case of Binomial Distribution
3. What do you mean by Correlation between two random variables?
4. Discuss briefly the Bernoulli's distribution.
5. Define Type-I and Type-II errors.
6. State central limit theorem.
7. Write the relations between L_q, L_s, W_q, and W_s in (M/M/1) : (∞/FIFO) model.
8. Write some applications of queuing theory
9. Suppose that the probability of a dry day (state 0) follows a rain day (state 1) is 1/3 and probability of a rain day follows a rain day is 1/2. Find out the two state Markov chain and transition probability matrix.
10. Test the matrix $\begin{bmatrix} 1 & 0 \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$ is stochastic or not.

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. The probability that a bomb dropped from a plane will strike the target is 1/5. If six bombs are dropped, find the probability that (i) exactly two will strike the target (ii) at least two will strike the target.

3. In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as 4x-5y+33=0 and 20x-9y=107 respectively. Calculate $\bar{x}$, $\bar{y}$ and the coefficient of correlation between x and y.

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. ON the basis of their total scores, 200 candidates of a Civil service examination are divided into two groups, the upper 30% and the remaining 70%. Consider the first question of the examination. Among the first group, 40 had the correct answer, where as among the second group, 80 had the correct answer. On the basis of these results, can one conclude that the first question is not good at discriminating ability of the type being examined here?

OR

6. The following table gives the number of aircraft accidents that occurred during the various days of the week. Find whether the accidents are uniformly distributed over the week

Day	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
No. of accidents	14	16	8	12	11	9	14	84

7. At a certain petrol pump, customers arrive in a Poisson process with an average time of five minutes between arrivals. The time intervals between serves at the petrol pump follows exponential distribution and the mean time taken to service a unit is two minutes . Find the following: a) Average time a customer has to wait in the queue. b) By how much time the flow of the customers be increases to justify the opening of another service point, where the customer has to wait for five minutes for the service.

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) Write classification of stochastic process.
   b) Define irreducible and ergodic matrix.

OR

10. a) Check whether the following markov chain is ergodic and regular.   [8M]

$$\text{i) } P = \begin{bmatrix} 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{2} & 0 & 0 & \frac{1}{2} \\ \frac{1}{2} & 0 & 0 & \frac{1}{2} \\ 0 & \frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{bmatrix} \qquad \text{ii) } P = \begin{bmatrix} 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{2} & 0 & 0 & \frac{1}{2} \\ \frac{1}{2} & 0 & 0 & \frac{1}{2} \\ 0 & \frac{1}{2} & \frac{1}{2} & 0 \end{bmatrix}$$

   b) Define regular stochastic matrix and give an example.   [2M]

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, EXAMINATIONS,

DECEMBER-2018

Subject: **Metallurgy and Materials Science**

Branch: ME

Time: 3 hours   Max. Marks: 75

PART – A

I. Answer ALL questions of the following   5x1Mark=5 Marks
1. Define grain size.
2. What is allotropy?
3. What are the properties of low alloy steels?
4. Write the applications of Titanium alloy.
5. Define glass.

II. Answer ALL questions of the following   10x2Mark=20 Marks
1. Discuss the crystallization of metals.
2. List the types of solid solutions.
3. State Gibb's phase rule.
4. Define lever rule.
5. Discuss die steels.
6. List the classification of cast iron.
7. What is the purpose of case hardening?
8. Write about Al-Si alloys.
9. List the classification of composites.
10. What are FRP?

PART-B

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

1. Discuss grain-grain boundary galvanic cells.

(OR)

2. State Hume-Rothery rules that govern the formation of solid solutions.

3. Draw neatly Iron-carbon phase diagram and mark on it all salient temperatures, compositions and phases.

(OR)

4. Illustrate the effects alloying elements on the eutectoid temperature of steels.

5. Give the composition, structure and their applications of
   a) S.G. Iron   b)Malleable Iron   c) Heat Resistant Steel

(OR)

6.   a) Discuss AISI-SAE designation of steels, with examples. b) What is plain carbon steel?

7. Discuss the process temperature range, microstructure of products and applications of steel relief annealing.

(OR)

8. Name at least four important copper base alloys. Give composition microstructure and their applications.

9. Define ceramic material and give classification of ceramics. Enumerate important characteristic of ceramics.

(OR)

10 Using neat sketch, explain the process of preparation of metal matrix composite using melting and casting method.

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-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 poisson's ratio.
2. What are the different types of beams?
3. Define bending stress.
4. State the requirement of good shaft material.
5. Define hoop stress.

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

1. Explain the terms – lateral strain and longitudinal strain.
2. Define thermal stress.
3. Explain the different types of loads acting on the beam?
4. Draw the shear force and bending moment diagram of simple supported beam of length L subjected to a point load W at the centre of the beam.
5. State any four assumption made in the theory of simple bending.
6. Define bending stress and section modulus.
7. State the formula for deflection of simply supported with a point load W at the centre of the beam.
8. A solid circular shaft is transmitting 1.5 kN-m torque at 1440 r.p.m. Find the power transmitted through it.
9. Derive an expression for longitudinal stress in thin cylinder subjected to internal pressure.
10. What is redundant frame?

PART-B

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

1. A bar of 25 mm diameter is subjected to an axial pull of 62.5 kN. The extension over a gauge length of 200 mm is 0.4 mm and decrease in diameter is 0.013 mm. Calculate i) Modulus of elasticity.
   ii) Modulus of rigidity   iii) Bulk modulus and iv) Poisson's ratio.

(OR)

2. A test bar of certain material 40 mm diameter when subjected to an axial pull of 500 kN recorded an extension of 0.34 mm on a gauge length of 150 mm and decrease of 0.022 mm in diameter. Find the poission's ratio and three elastic constants.

3. A beam of length 4 m is simply supported at its ends and carries two points' loads of 5 KN and 4 KN at distances of 1 m and 2 m from the left end support. Draw the SFD and BMD.

(OR)

4. Draw the SFD and BMD of cantilever beam of length 4 m subjected to uniformly distributed load of 6kN/m over the entire length of the beam and a point load of 8kN at a distance 2m from the free end.

5. A timber beam of rectangular section is to support a load of 20 kN uniformly distributed over a span of 3.6 m. If the depth of the section is to be twice the breadth, and the stress in timer is not to exceed 7 N/mm^2, find the dimensions of the cross-section.

How would you modify the cross-section of the beam if it were a concentrated load placed at the centre with the same ratio of breadth to depth.

(OR)

6. A 10 mm long cast iron pipe 400 mm inside diameter and 25 mm wall thickness runs full of water and supported at its ends. Determine the maximum stress intensity in the metal if the density of cast iron is 70.6 kN/m^3 (specific weight of cast iron) and that of water is 10 kN/m^3

7. A cantilever of length 5 m carries u.d.l of 3 kN/m over a length of 1.5 m from fixed end and a point load 2 kN at free end. If the section is 80 mm x 120 mm deep, calculate the slope and deflection at free end. Take E = 2 x10^5 N/mm^2.

(OR)

8. (A) Derive the torsion equation. **(6M)**

(B) A solid shaft of diameter 20 mm is subjected to a torque of 25 Nm. Find   the angle of twist over a length of 600 mm. Take G = 0.8 x 10^5 N/mm^2.   **(4M)**

9. A cylindrical shall 5 m long, 1 m in diameter and metal thickness 12 mm is subjected to an internal pressure of 1.2 N/mm^2. Calculate the maximum intensity of shear stress induced and also the change in the dimensions of the shell.

(OR)

10. A cylindrical shall 1 m long, 150 mm internal diameter having thickness of metal as 10 mm is filled with fluid at atmospheric pressure. If an additional 15 cm^3 of fluid is pumped into the cylinder, find the pressure exerted by the fluid on the cylinder and corresponding hoop stress induced.

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

Subject: **Machine Drawing**

Branch: **ME**

Time: 3 hours   Max. Marks: 75

PART – A

I. Answer any 2 question of the following   **2x15Mark=30 Marks**

1. Draw double riveted zigzag lap joint of 12 mm thick plates using snap headed rivets. Show at least three rivets in the plan view and add a sectional elevation. Mark the dimensions in terms of the rivet diameter d.
2. Sketch socket and spigot joint to connect two pipes of 180 mm diameter. Indicate proportionate dimensions of various parts of the joint.
3. Draw the sectional front view and side view of a cotter joint with sleeve used to connect two rods of 50 mm diameter each.

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)
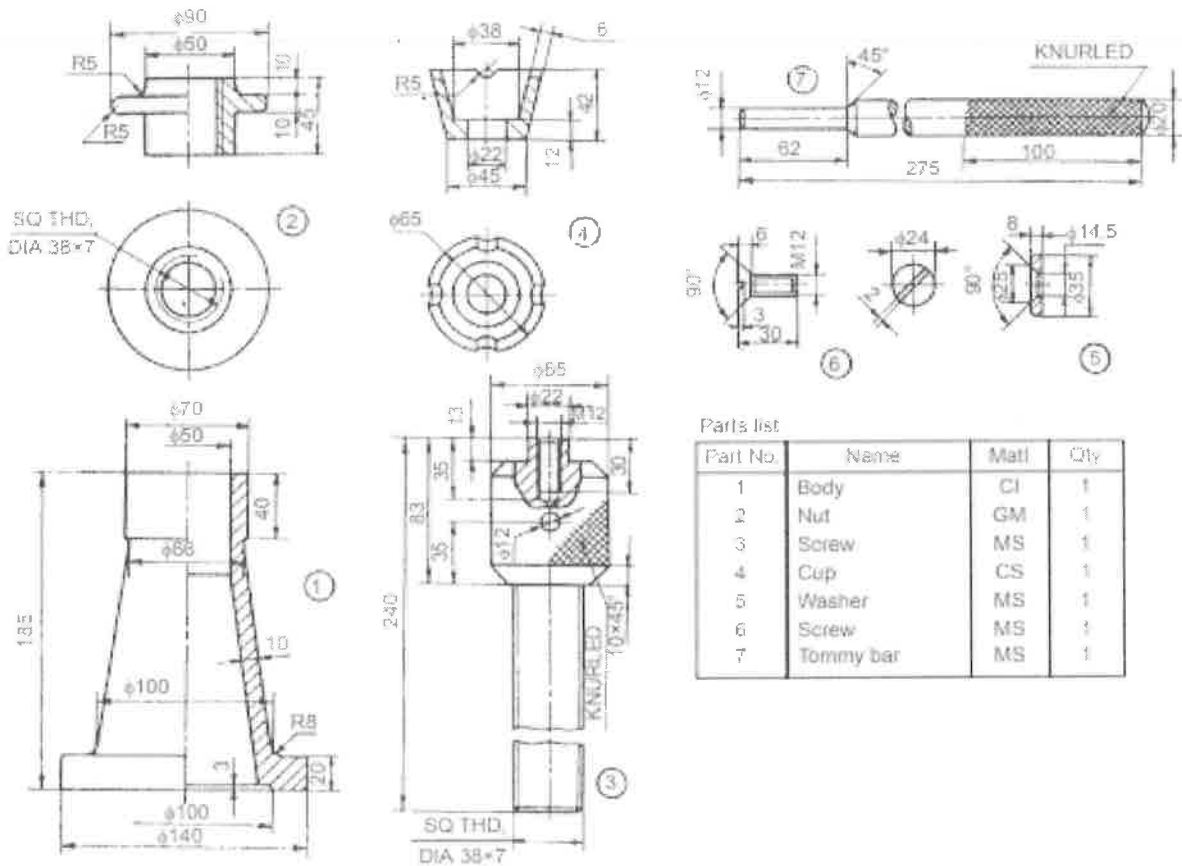
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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2018

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. Define electric power?

2. What is transformation ratio?

3. List out the various armature windings in DC machines.

4. Draw the symbols of PNP and NPN junction transistors?

5. What is meant by electro static deflection sensitivity?

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

1. What are the equivalent resistances in delta when three 1Ω resistances are connected in star configuration?

2. State faraday's laws of electromagnetic induction.

3. Define electric flux and reluctance.

4. Distinguish between core type and shell type transformers.

5. Write the simple classification of DC motors.

6. When a 4-pole, 50 Hz, 415V induction motor runs at a speed of 1470 rpm, Find the slip frequency.

7. Draw the V-I characteristics of p-n junction diode?

8. Write the applications of a Diode.

9. What is a Barkhausen criterion in oscillators? Write its importance.

10. Explain the frequency measurement of a waveform using a CRO with an example.

PART-B

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

1. a) State and explain Kirchhoff's laws.

   b) Discuss passive and active elements?

(OR)

2. a) State and explain superposition theorem with an example.

   b) Write the difference between series and parallel circuits.

3. a) Explain the principle of operation of a single phase transformer.

   b) A 2 kVA, 230V /115V single-phase transformer, its Copper loss is 240W and iron loss is 40 W. Calculate the efficiency of the transformer at full load and 0.8 pf.

(OR)

4. Explain the procedure to conduct O.C. and S.C. test on single phase transformer with neat circuit diagrams.

5. a) Derive the EMF equation of a DC generator.

   b) Discuss the operation of a DC machine as a motor.

(OR)

6. Develop the expression for Torque in a three phase induction motor.

7. a) Draw and explain the characteristics of zener diode.

   b) Transistor acts as an amplifier? Justify.

(OR)

8. Describe the operation of half wave rectifier, draw its output waveform and derive its ripple factor.

9. Explain the difference between Hartley and Colpitts oscillators in detail.

(OR)

10. Draw the structure of CRT and explain the main components of CRT.