Code No.: 30423/40323

MR13 & MR14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

III B. TECH. II SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2017

SUBJECT: **AUTOMOBILE ENGINEERING**

BRANCH: **ME**

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

PART-A

Answer the following Questions **5×1=5M**

1. Define Super charger.
2. What is the function of fins in air cooling system?
3. What do mean by earthing?
4. What is the importance of dog clutch in constant mesh gear box?
5. Define caster angle.

Answer the following Questions **10×2=20M**

1. What is port injection and how is it different from manifold injection?
2. How engine tuning will be carried out?
3. What is the need of thermostat?
4. Differentiate between air cooling and Liquid cooling.
5. What are the disadvantages of using LPG in SI engine?
6. What are the different types of fuel gauges?
7. State the components of clutch and write the function of diaphragm spring.
8. What is the function of a universal joint?
9. The modern cars invariably employ an anti-roll bar – why?
10. What is the difference between mechanical and hydraulic braking system?

PART-B

Answer the following Questions **5×10=50M**

1. a) Enumerate various types of governors used in petrol engines. Explain any one of them with a neat diagram.

   b) Explain the valve timing diagram of four stroke diesel engine with suitable diagram? What is meant by valve over lapping time?

(OR)

2. a) Explain splash type lubrication system with a neat sketch.

   b) What are the requirements of fuel injection system in diesel engine? Explain.

3. a) Describe automatic centrifugal advance mechanism with a suitable diagram.

   b) With a neat schematic diagram explain a magneto ignition system employed on two wheeler.

(OR)

4. a) What are the requirements of an ignition system?

   b) Compare battery ignition system with magneto ignition system.

5. a) Explain the reasons for looking into alternate fuels for IC engines?

   b) What is natural gas? What are the advantages and disadvantages of using natural gas as alternative fuels?

(OR)

6. How does an automobile contribute toward-pollution of atmosphere? Discuss various methods to reduce the emission of pollution in exhaust gases?

7. a) What is a whirling of a propeller shaft? Discuss the parameters on which whirling of propeller shaft depends?

   b) Explain the working principle of a device which is used to function as clutch and change in the torque by providing variable gear ratio?

(OR)

8. a) What is the need of using differential? Enumerate different types of differentials?

   b) Explain with suitable diagram how to overcome fluid slippage in direct drive?

9. a) Explain the Pascal's law and its contribution to obtain lager leverage on a hydraulic braking system?

   b) Explain the working principle of a vacuum break with a neat diagram.

(OR)

10. a) State the principle and derive equation for correct steering a vehicle.

    b) Explain the construction and working principle of a torsion bar with a neat sketch?

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MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)

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

III B.Tech II Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **Finite Element Methods**

Branch: **ME**

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

PART – A

I. Answer All Questions **5x1Mark=5Marks**

1. What is meant by finite element method?
2. What is a bar element.
3. Illustrate the methods used in deriving the stiffness matrix of the beam?
4. Draw the outline diagram of CST Element.
5. What is 1-D fin element?

II. Answer All Questions **10x2Marks=20Marks**

1. What are the steps involved in finite element model?
2. What are the various applications of FEM.?
3. Define shape function and write the properties of shape functions?
4. What are the properties of truss bar element?
5. Write the load vector for the beam.
6. Write short notes on different types of loading on beams.
7. Write one-point formula.
8. State how the 2D problems are classified and define each with an example.
9. Write down the expression of shape function N and temperature function, T for one dimensional heat conduction problem.
10. Differentiate between conduction and convection.

PART-B

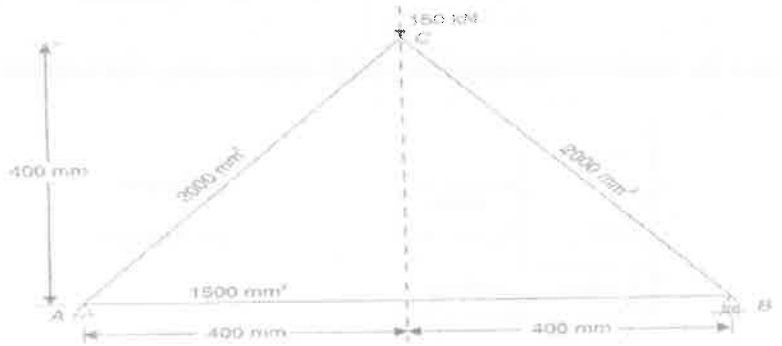
Answer all questions **5x10 Marks= 50Marks**

1. Describe the relation between stress & strain by considering plane stress approach in 3D.

(OR)

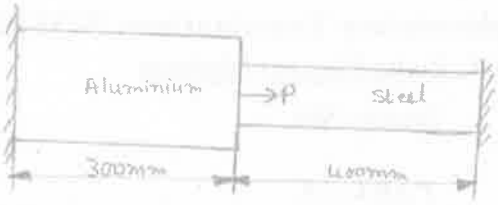
2. Derive the strain displacement equations and equations of equilibrium.

3. For the three – bar truss shown in Figure, determine the modal displacements and the stress in each member. Find the support reactions also. Take modulus of elasticity as 200 GPa.



(OR)

4. Consider the bar as shown in fig. an axial load is $p=200x10^3$N as applied using the penality approach by handling boundary conditioning to the following. Determine the nodal displacement, stress in each material reaction forces

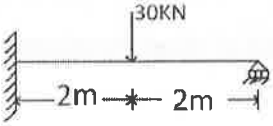


$A_1 = 240mm^2$ $A_2 = 600mm^2$
$E_1 = 70x10^9 N/m^2$ $E_2 = 200x10^9 N/m^2$

5. a) Compare the characteristics of beam element with truss element?
   b) Derive the load vector for the specified uniform distributed load acting on the beam element?

(OR)

6. For the beam shown in figure calculate the deflection under the load and find the shear force and bending moment for the beam.



$E=20*10^6 N/cm^2$

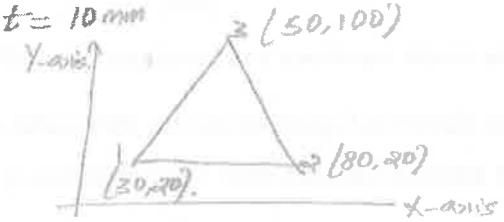
$I= 2500cm^4$

7. The coordinates of the nodes 1, 2 and 3 of a triangular element are (1, 1), (8, 4) and (2, 7) in mm. The displacements at the nodes are $U_1 = 1$ mm, $U_2 = 3$ mm, $U_3 = -2$ mm, $V_1 = -4$ mm , $V_2 = 2$ mm and $V_3 = 5$ mm. Obtain the strain-displacement relation matrix B and determine the strains and stresses. Assume plane stress condition and thickness of plate, t=4mm, Poisson's ratio, μ=0.25, Young's Modulus, E=210Gpa.

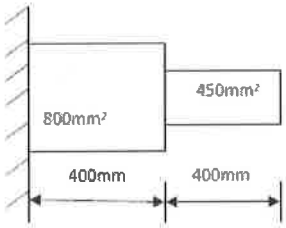
(OR)

8. For the plane stress element shown in Fig. evaluate the [D] and [B] .Assume $E=210x10^3$ N/mm^2 μ=0.25,t=10mm

$\mu = 0.25$, $t = 10$ mm



9. Determine the natural frequencies and mode shapes using characteristic polynomial technique.



E= 200 GPa

ρ = 7850 Kg/m³

(OR)

10. Derive the basic Governing Differential Equation for 1D-heat conduction with convection?

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

III B.Tech II Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **REFRIGERATION AND AIR CONDITIONING**

Branch: **ME**

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

PART-A

Answer the following Questions **5×1=5M**

1. What are the different organic refrigerants?
2. What is the use of P-H chart?
3. What is working principle of steam jet refrigeration system?
4. Explain about Air conditioning.
5. Name different types of Air filters.

Answer the following Questions **10×2=20M**

1. What is evaporator?
2. What are the different types of ideal cycles of refrigeration?
3. What are the parameters influencing the Vapor Compression system?
4. Discuss the working principle of capillary tube in refrigeration system.
5. Write any four advantages of steam jet refrigeration system.
6. Write about the functioning of rectifier in VARS.
7. Explain about latent heat.
8. How are air conditioning equipments classified?
9. State the factors that determine human comfort.
10. What are the factors affecting the Grill performance?

PART-B

Answer the following Questions **5×10=50M**

1. A refrigerating system working on Bell- Coleman cycle receives air from cold chamber at -5^{0}C and compresses it from 1 bar to 4.5 bar. The compressed air is then cooled to a temperature of 37^{0}C before it is expanded in the expander. Calculate the C.O.P of the system when compression and expansion are:

   i) Isentropic ii) follow the law $PV^{1.25}$=constant

(OR)

2. A dense air refrigeration cycle operates between pressure of 4 bar and 16 bar. The air temperature after heat rejection to surroundings is 37^{0}C and air temperature at exit of refrigerator is 7^{0}C. The isentropic efficiencies of turbine and compressor are 0.85 and 0.8 respectively. Determine compressor and turbine work per TR.

3. Explain the working of vapour compression refrigeration cycle with a neat sketch.

(OR)

4. Explain with neat sketch the working principle of Lithium Bromide absorption refrigeration system (2 shell).

5. Explain the working principle of thermoelectric refrigeration system. What are the advantages and Disadvantage of this system?

(OR)

6. The following data refers to a 20 TR ice plant using ammonia as refrigerant:
   The temperature of water entering and leaving the condenser are 20°C and 27°C and temperature of brine in the evaporator is -15°C.
   Before entering the expansion valve, ammonia is cooled to 20°C and the ammonia enters the compressor dry saturated.
   Calculate for one tone of refrigeration the power expended, the amount of cooling water in the condenser and the coefficient of performance of the plant. Take specific heats for liquid and vapour ammonia as 4.606 and 2.805 kJ/kg K at 25°C.

7. Derive the expression for
   i) Specific humidity ii) Degree of saturation
   iii) Relative humidity iv) Enthalpy of moist air.

(OR)

8. What is psychometric? Explain different psychometric properties.

9. What is an effective temperature? Explain briefly about effective temperature chart and comfort chart.

(OR)

10. Explain in detail how the human body reacts to changes in temperature of environment. Also explain the effect of activities on the heat load calculation for comfort application.

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

III B.Tech II Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **DESIGN OF MACHINE MEMBERS-II**

Branch: **ME**

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

PART – A

I. Answer All Questions **5x1Mark=5Marks**

1. What is bearing?
2. Classify cylinder liner.
3. How a rope is specified.
4. Define law of gearing.
5. Write any two properties of worm gears.

II. Answer All Questions **10x2Marks=20Marks**

1. State any two advantages of Hydro dynamic bearing over Hydro static Bearing.
2. Explain bearing modulus for journal bearings.
3. Sketch a neat diagram of trunk type piston and label the parts.
4. What are the methods and materials used in the manufacture of crankshafts?
5. What are the applications of Belt Drives?
6. Derive the condition for transmission of maximum power in belt drives.
7. Define virtual number of teeth for helical gears.
8. Define the terms: a) circular pitch b) pitch point
9. In the design of power screws, on what factors does the thread bearing pressure depend? Explain.
10. Why are square threads preferable to V-threads for power transmission?

PART-B

Answer all questions **5x10 Marks= 50Marks**

1. A ball bearing is required to resist a radial load of 10kN and thrust load of 5kN. The average life of the bearing is to be 5000hrs with inner race is at rotation at 980 rpm. What basic dynamic load rating must be used in selecting the bearing? If the bearing is to have a life of 5000 hrs at reliability 97%, what is the basic required dynamic load capacity?

(OR)

2. A journal bearing is to be designed for a centrifugal pump for the following data: Load on the journal=12KN; Diameter of the journal=75mm; Speed= 1440rpm; Atmospheric temperature of the oil=16^0C; Operating temperature of the oil=60^0 C; Absolute viscosity of oil at 60^0C= 0.023kg/m-s. Give a systematic design of the bearing.

3. Design a cast iron piston for a single acting four stroke engine for the following data: Cylinder bore=100mm; Stroke=125mm; Maximum gas pressure=5N/mm^2; Indicated mean effective pressure=0.75N/mm^2; Mechanical efficiency=80%; Fuel consumption =0.15kg per brake power per hour; Higher calorific value of fuel= 42x10^{3}kJ/kg; Speed=2000rpm. Any other data required for the design may be assumed.

(OR)

4. Design a trunk piston for an IC engine. The piston is made of cast iron with an allowable stress of 38.5MPa. The bore of the cylinder is 200mm and the maximum explosion pressure is 0.4MPa. The permissible bending stress of the gudgeon pin is 100MPa. The bearing pressure in the gudgeon pin bearing of the connection rod is to be taken as 200MPa.

5. In a crossed belt drive: the diameter of the driver and the follower pulleys are 200mm and 400mm respectively. The centre distance of the drive is 2m. The driver pulley rotates at 400 rpm. Find the angle of contact between belt and both the pulleys, and the length of the belt required.

(OR)

6. A rope drive transmits 600KW from a pulley of effective diameter 4m, which runs at a speed of 90rpm. The angle of lap is 160^0; the angle of grove 450^0; the coefficient of friction 0.28; the mass of rope 1.5kg/m and the allowable tension in each rope 2400N. Find the number of ropes required?

7. Derive the Lewis beam strength equation for Bevel gears.

(OR)

8. A Bronze spur pinion rotating at 600rpm. Drives a cast iron spur gear at a transmission ratio of 4:1. The allowable static stresses for the bronze pinion and cast iron gear are 84mpa and 105mpa respectively.The pinion has 16 standard 20^0 full depth in volute teeth of module 8mm. The face width of both the gear is 90mm. Find the power that can be transmitted from the stand point of strength.

9. A triple threaded worm has teeth of 6mm module and pitch circle diameter of 50mm. If the worm gear has 30 teeth of $14\frac{1}{2}^0$ and the coefficient of friction of the worm gearing is 0.05, find 1) the lead angle of the worm 2) velocity ratio 3) center distance and 4) efficiency of the worm gearing.

(OR)

10. The mean diameter of the square threaded screw having pitch of 12mm is 45mm. A load of 40kN is lifted through a distance of 170mm. find the work done in lifting the load and the efficiency of the screw, when a) the load rotates with the screw and b) the load rests on the loose head which does not rotate with the screw. The external and internal diameters of the bearing surface of the loose head 60mm and 10mm respectively. The coefficient of friction for the bearing surface may be taken as 0.1.

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

III B.Tech II Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **Heat Transfer**

Branch: **ME**

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

PART – A

I. Answer All Questions **5x1Mark=5Marks**

1. Define Newton's law of convection.
2. Write the temperature distribution equation for a long fin.
3. Define Nusselt number.
4. What is Pool boiling?
5. Draw the temperature distribution of a counter flow heat exchanger.

II. Answer All Questions **10x2Marks=20Marks**

1. Explain the conduction heat transfer in metals.
2. A pipe is insulated to reduce the heat loss from it. However, measurement indicates that the rate of heat loss has increased instead of decreasing. Can the measurement be right? Comment.
3. What is the physical significance of the Fourier number?
4. BIOT number = hl_c / k
   Where Lc= characteristic length; define it.
5. List out the dimensionless numbers used in forced convection.
6. In forced convection, distinguish between upstream velocity and free stream velocity. For which type of flow are the two same?
7. What are the dimensionless numbers used for free convection?
8. Define Boiling process and list the different types of Boiling.
9. State Stefan-Boltzmann law of Radiation.
10. Briefly discuss on LMTD of counter flow heat exchanger.

PART-B

Answer all questions **5x10 Marks= 50Marks**

1. An insulated steel pipe(K=58 W/mK) carrying a hot liquid. Inner diameter of the pipe is 25 cm , wall thickness is 2 cm, thickness of insulation(k= 0.24 W/mK) is 5 cm, temperature of hot liquid is 100°C, temperature of surrounding is 20°C, inside heat transfer coefficient is 740 W/m^{2}K and outside heat transfer coefficient is W/m^{2}K. Calculate
   (i) the heat loss per metre length of the pipe and
   (ii) Interface temperature between steel pipe and insulation.

(OR)

2. A composite slab consists of 250 mm fire clay brick (k=1.09 W/mK) inside, 100 mm fired earth brick(k=0.26 W/mK) and outer layer of common brick (k=0.6 W/mK) of thickness 50 mm. If inside surface is at 1200^{0}C and outside surface is at 100^0 C, find
   a) heat flux, b) the temperature of the junctions and
   c) the temperature at 200 mm from the outer surface of the wall.

3. a) Aluminum fins of rectangular profile are attached on a plane wall with 5 mm spacing. The fins have thickness 1 mm, length = 10 mm and the thermal conductivity K = 200 W/mk. The wall is maintained at a temperature of 200^0C and the fins dissipate heat by convection into ambient air at 40^0C, with heat transfer coefficient h = 50 W/m^2K. Find the heat loss. **[6M]**

   b) Explain the method of error measurement of temperature. **[4M]**

(OR)

4. A slab of Aluminum 100mm thick is originally at a temperature of 500^0C. It is suddenly immersed in a liquid at 100^0C resulting it a heat transfer coefficient of 1200 W/m^2k. Calculate the following
   (a) Temperature at the centerline after 1 minute.
   (b) Temperature at the surface.
   (c) Total thermal energy removal per unit area.

   The properties of aluminum for the given condition are: $\alpha = 8.4 \times 10^{-5} m^2/s$, K=215 W/mK, $\rho = 2700$ kg/m^3, Cp= 0.9 kJ/kg-K.

5. Air flow through a long rectangular (30 cm height x 60 cm width) air conditioning duct maintains the outer duct surface temperature at 15^0C. If the duct is uninsulated and exposed to air at 25^0C, calculate the heat gained by the duct per meter length, assuming it to be horizontal.

(OR)

6. Air at 2 atm and 200^0 c having density 1.493 kg/m^3 is heated as it flows at a velocity of 12 m/s through a tube with diameter of 3cm. A constant heat flux condition is maintained at the wall and the wall temperature is 20^0 c above the air temperature all along the length of the tube. Calculate heat transfer per unit length of the tube.

   Properties of air at 200^0 c are P_r=0.681, μ= 2.57 x 10^{-5} kg/ms, K=0.0386 W/mK and C=1.025 kj/kg

   Use relation: $Nu=0.023 \times (R_e)^{0.8} (P_r)^{0.4}$

7. a) Discuss the effect of non condensable gases on condensation.

   b) Saturated steam at 54° C condenses as a film on the outside surface of a 25mm OD, 3.66m long vertical tube. The tube surface is maintained at a temperature of 43^0 C. Calculate the average condensation heat transfer coefficient and the rate of steam condensation at the bottom of the tube.

(OR)

8. a) S.T by dimensional analysis that data for free convection may be correlated by an equation of the form Nu = f(Gr Pr).

   b) Calculate the convective heat loss from radiator 0.5m wide and 1m high maintained at a temperature of 84°C, in a room at 20°C. Treat radiator has a vertical plate

9. a) Two parallel grey planes with emissivities of 0.8 and 0.7 are maintained at 800° C and 1500^oC.What is the net radiant energy exchange? What would be the reduction in heat transfer if a radiation shield of polished aluminum(Emissivity = 0.04) is placed between them? **[6m]**

   b) Derive an expression for net radiation heat transfer between two infinitely parallel plates with a radiation shield between them **[4m]**

(OR)

10. a) Define i) planck's law ii) wein's displacement law iii) intensity of radiation **[6m]**

    b) Two opposed, parallel infinite planes are maintained at 400^0C and 460^0C respectively. Calculate the net radiant heat flux between these planes if one an emissivity of 0.6 and the other an emissivity of 0.4. **[4m]**

Code No.: **30B04/40B04**

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

III B.Tech II Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **Human Values And Professional Ethics**

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

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

PART – A

I. Answer All Questions **5x1Mark=5Marks**

1. Define Ethics.
2. What is 'Self Assessment'?
3. Define Trade Mark.
4. Define Value Education.
5. What do you understand by Eustress?

II. Answer All Questions **10x2Marks=20Marks**

1. Compare between moral values and ethical values.
2. Honesty is the best policy-Discuss.
3. Distinguish between Untrained and Trained Memory.
4. Explain how one can assess oneself.
5. What are copy rights?
6. Explain moral dilemma with an illustration.
7. Discuss the meaning of Universal Brotherhood.
8. What are basic aspirations of Human Beings?
9. Enumerate the negative influences of stress on human health.
10. What do you know about Sympathy?

PART-B

Answer all questions **5x10 Marks= 50Marks**

1. As a Citizen of the country every individual has Social Responsibility for the betterment of the society – Justify the statement with examples.

(OR)

2. Why it is important for every citizen to be socially responsible?
3. Discuss Howard Gardener's Multiple Intelligence Model.

(OR)

4. Explain the need of self discipline.
5. Discuss the Carol Gilligan's Theory Moral Development?

(OR)

6. What are customs religion professional life?
7. Value Based Education shapes the Personalities of the Individuals Unique - Justify the statement with examples.

(OR)

8. What are the contents of value education?
9. Identify the different techniques of Stress Management to lead better life?

(OR)

10. Explain how spirituality helps an individual to know the purpose his life