Code No.: **30322/40324**

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, MAY-2019

Subject: **Finite Element Methods**

Branch: **ME**

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

PART – A

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

1. Define Strain?
2. How do you calculate the size of the global stiffness matrix?
3. How many degrees of freedom are there per node of a beam element?
4. Draw the outline diagram of ax symmetric element
5. Write the stiffness matrix equation for one dimensional heat conduction element

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

1. Define Element?
2. State and explain virtual energy principle.
3. Illustrate the properties of shape function
4. Illustrate a plane stress condition.
5. Name the different type of beams with neat sketch.
6. Draw the representation of the Hermite shape functions of the beam?
7. Sketch the quadrilateral element with nodal structure
8. What do you mean by isoperimetric representation
9. Write FEM equation for 1-0 heat conduction
10. What parameters are considered in composite slabs for heat transfer?

PART-B

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

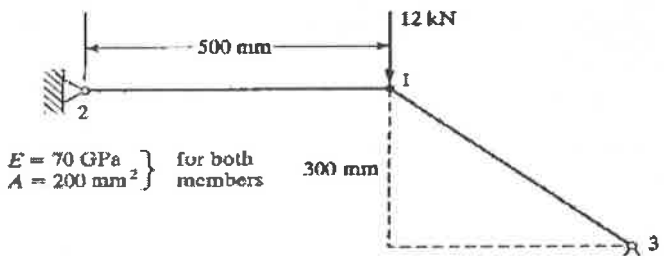
1. Derive Rayleigh Ritz method.

OR

2. Derive the strain displacement equations and equations of equilibrium.
3. Derive the element stiffness matrix, work potential due to body force & traction for 1D-2 Noded bar Element.

OR

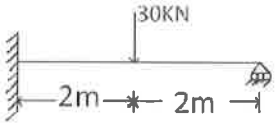
4. Calculate the nodal displacements at node 1 and stress in the element 1 – 3 for the truss shown in Figure.



5. Derive the Hermit shape function and stiffness matrix equation of beams?

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.



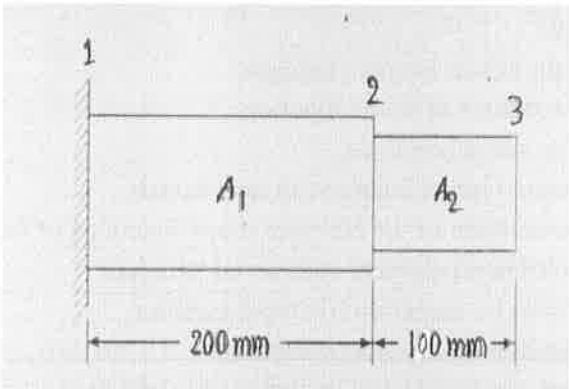
$E=20*10^6 N/cm^2$

$I= 2500cm^4$

7. A metallic fin with thermal conductivity K = 360W/mK, 0.1 cm thick and 10cm long, extends from a plane wall whose temperature is 235^0C. Determine the temperature distribution and amount of heat transferred from the fin to the air at 20^0C with $h = 9W/m^2K$. Take width of the fin as 1m.

OR

8. Derive the stiffness matrix for a CST element.
9. Evaluate eigenvectors and eigenvalues for the stepped bar shown in figure. Take E=200 GPa and specific weight 7850 kg/m^3. Draw mode shapes. Take $A_1 = 400\ mm^2$ and $A_2 = 200\ mm^2$.



OR

10. Determine the eigen value of the stepped bar shown in Figure. Take E=200GPa, weight density 7850 kg/m^3.

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

Subject: **Design of Machine Members – II**

Branch: **ME**

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

PART – A

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

1. Define bearing number.
2. Name the materials used for engine piston.
3. State the law of belting.
4. What are the commonly used gear materials?
5. What are the various forces acting on worm gears?

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

1. Why taper roller bearings are used in pairs?
2. What is a Journal Bearing?
3. Define Buckling in connecting rod.
4. State the various types of stresses induced in the connecting rod.
5. Write the types of ropes.
6. Classify different types of pulleys.
7. Define (i) pressure angle (ii) pitch circle with respect to gears.
8. Define wear load capacity of a gear drive.
9. What is 'self-locking' of power screw?
10. What is 'overhauling' of power screw?

PART-B

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

1. Design a hydrodynamic journal bearing for a centrifugal pump. The diameter of the journal is 150 mm and its speed is 900 rpm. The load on the journal is 40 kN. Absolute viscosity of the turbine oil at the operating temperature 55^0C is 0.018 Ns/m^2.

OR

2. A ball bearing is operating on a work cycle consists of three parts

   A radial load of 3000N at 1440rpm for ¼ cycle

   A radial load of 5000N at 720rpm for ½ cycle

   A radial load of 2500N at 1440rpm for the remaining cycle.

   The expected life of the bearing is 10,000hrs. Calculate the dynamic load carrying capacity of thc bcaring.

3. The connecting rod of petrol engine is designed for the following data.
   Piston dia=80mm, stroke=120mm, Weight of reciprocating parts=15N, Length of connecting rod = 240mm, Max. Speed= 240mm. Explosion pressure corresponding to 10^0 of crank angle is 3MPa. Factor of safety is 6. If the connecting rod is to be made of 40Cr steel, find the dimensions of I- section of the connecting rod.

OR

4. Design a cast iron piston for a single acting four stroke IC engine for the following data.
   Cylinder bore=100mm, stroke length=120mm, Max. gas pressure= 6MPa,
   BMEP = 0.7MPa, Fuel consumption= 0.24kg/kW/hr.

5. It is required to select a flat belt drive for a compressor running at 720 rpm, which is driven by a 25 kW, 1440 rpm motor. Space is available for a centre distance of 3 m. The belt is open type.

OR

6. A belt, 100 x 10mm is transmitting power at 15m/s. The angle of contact on the driver (smaller) pulley is 156^0, if the permissible stress for the belt material is $2N/mm^2$; determine the power that can be transmitted at this speed. Take the density of leather as $1000kg/m^3$ and coefficient of friction as 0.25. Calculate the maximum power that can be transmitted.

7. It is required to design a pair of spur gears with 20^0 full depth involute teeth. The pinion shaft is connected to a 10 kW, 1440 rpm motor. The speed reduction is 4. Both the pinion and gear is made of plain carbon steel 40C8 (S_{ut} = 600 N/ mm^2). The factor of safety is 1.5. Velocity factor is used to account for dynamic load. Design the gears, specify their dimensions.

OR

8. A spur steel pinion is to drive a spur steel gear. The diameter of the pinion is 100 mm and the centre distance is 200 mm. The pinion is to transmit 5 kW at 900 rpm. The teeth are 20^0 full depth involute system. The static strength of the pinion and gear material is 200 N/mm^2 and 140 N/mm^2 respectively. Determine the module and face width, based on the strength point of view only.

9. A pair of worm and worm wheel is designated as 2/52/10/4. A 10 kW power at 720 rpm is supplied to the worm shaft. The coefficient of friction is 0.04 and the pressure angle is 20^0. Calculate the tangential, axial and radial components of the resultant of the gear tooth force acting on the worm wheel.

OR

10. A speed reduction unit is to be designed for an input of 3kW, with a transmission ratio of 20. The speed of the hardened steel worm is 1800 rpm. The worm gear is to be made of phosphor bronze. The tooth form is to be $14^1/2^0$ involute. Determine the principal dimensions from the stand point of strength.

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III B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, APRIL-2019

Subject: **Automobile Engineering**

Branch: **ME**

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

PART – A

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

1. What is the difference between frame and chassis?
2. What do mean by anti-freezing solution
3. What do mean by short circuiting
4. Write any two differences between multi plate clutch and magnetic clutch.
5. Define Camber

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

1. Define chassis and what are the parts mounted on it
2. Explain the mechanism of fuel injection system.
3. Why does Spark Plug sometimes misfire
4. What is the purpose of presm cap in the radiation
5. What is the purpose of using two filament bulbs
6. What is the purpose of using halogen bulbs
7. What is the need of clutch in the transmission system
8. What is the function of a king pin.
9. What is the difference between dependent and independent suspension in automobile?
10. What is steering axis?

PART-B

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

1. What are the various components of chassis? Draw layout of front wheel drive and rear wheel drive chassis?

OR

2. What is a function of carburetor? And describe the simple carburetor with sketch.
3. Give a short note on thermo-syphon cooling system? Explain in detail air cooling method?

OR

4. What are the factors affecting ignition timing? Explain in detail.
5. Discuss the requirement automotive head lights and explain how they have been meet with in modern design of head light.

OR

6. a) Explain different types of catalytic converters?
   b) What are the various pollution control technologies with respect to automobiles?
7. a) Explain the working principle of single plate friction clutchof diaphragm spring type with a neat diagram?
   b) Explain the working principle epicyclic gear box with neat sketch? (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. Write a brief note on
   a) Caster angle and its types b) Included angle c) Kingpin Inclination (OR)
10. a) Differentiate between Davis and Ackerman steering gear mechanisms.
    b) Describe about under steering and over steering

Code No.: **40325**

MR14

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

Subject: **Refrigeration and Air Conditioning**

Branch: **ME**

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

PART – A

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

1. What are the main applications of refrigeration?
2. What is sub cooling?
3. What is the use of shells in vapor absorption system?
4. List out the psychrometric properties.
5. What do you mean by human comfort?

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

1. Explain about Ozone depletion.
2. Why the COP of any refrigerating system is more than unity. Explain in detail
3. List out the disadvantages of wet compression.
4. Explain about condenser in vapour compression refrigeration system.
5. Write disadvantages of steam jet refrigeration system.
6. What are the components of the VARS.
7. Explain how GSHF may vary as the supply air quality and supply air condition change.
8. Draw the psychometric chart and show all the possible lines.
9. List the various industrial applications of air conditioning system.
10. Describe the concept of effective room sensible heat load

PART-B

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

1. A Bell-Coleman refrigerator works between 4 bar and 1 bar pressure limits. After compression, the cooling water reduces the air temperature to 17^0C. What is the lowest temperature produced by the ideal machine? Compare the C.O.P of this machine with that of the ideal Carnot cycle machine working between the same pressure limits, the temperature at the beginning of compression being- 13^0C

(OR)

2. Write about the factors which affect the heat transfer capacity of an evaporator.
3. Explain the working of vapour compression refrigeration cycle with a neat sketch.

(OR)

4. With a neat p-h and T-S diagrams explain the effect of sub cooling and super heating in Vapor compression refrigeration system.
5. Explain Lithium Bromide Absorption refrigeration system (4-shell) with a neat sketch.

(OR)

6. Mention the advantages & disadvantages of vapor compression refrigeration system over air refrigeration system.
7. Show the following processes on the skeleton psychrometric Chart and Explain:
   i) Dehumidification of moist air by cooling iii)Adiabatic mixing of two air streams
   ii) Heating and Humidification

(OR)

8. The amount of air supplied to an air conditioned hall is 300 m^3/min. The atmospheric conditions are 35^0C DBT and 55% RH. The required conditions are 20^0 C DBT and 60% RH. Find out the sensible heat and latent heat removed from the air per minute. Also find SHF.
9. How are air-conditioning equipments classified? Write about grills and registers.

(OR)

10. State and explain factors which govern optimum effective temperature.

Code No.: **30B04**

MR13

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

Subject: **Human Values and Professional Ethics**

Branch: **ME**

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

PART – A

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

1. What is 'Accountability'?
2. How do you define Spirituality?
3. What do you understand by Moral Dilemma?
4. Define SELF concept?
5. Define time management

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

1. Explain how empathy useful in professional life.
2. Explain the factors of time management
3. Discuss the importance of Self Discipline.
4. Write something about self learning
5. What do you mean by Intellectual Property Rights?
6. Describe the codes of ASME
7. Discuss the meaning of Universal Brotherhood.
8. How one can understand about himself/herself?
9. Enumerate the negative influences of stress on human health.
10. What is meditation & how it is useful.

PART-B

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

1. Briefly discuss the concept of civic virtue

OR

2. Why it is important for every citizen to be socially responsible?
3. Discuss the different procedures and types of Self Management

OR

4. What do you mean by trained memory?
5. What is American society of civil engineers and what are the code ethics for it.

OR

6. Discuss about trade mark and trade name
7. Enunciate the need of Value Based Education in Today's context.

OR

8. How does a person build up his character
9. Discuss different types of Stress in detail?

OR

10. List out the factors which are important for Personality Development.