Code No: R15A0321
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular/supplementary Examinations, April/May 2019
Machine Design-II
(ME)

Roll No										

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

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question   from each SECTION and each Question carries 10 marks.

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PART-A (25 Marks)

1). a	Differentiate full and partial journal bearings?	**[2M]**
b	If life of the bearing is 50×10^6 revolutions and operating speed is 1000rpm, what is the life of the bearing in hours.	**[3M]**
c	Differentiate the full floating and semi floating type of connection between piston pin and small end of connecting rod.	**[2M]**
d	State the function of the following i) compression rings ii) oil rings.	**[3M]**
e	What is centrifugal tension and state whether centrifugal tension affects the amount of transmitted power?	**[2M]**
f	When power is transmitting between pulleys of same diameter but different coefficient of friction, then on which pulley basis the design should be carried.	**[3M]**
g	What is the advantage of using helical gear over spur gear?	**[2M]**
h	Explain the Law of gearing?	**[3M]**
i	What is the virtual coefficient of friction that makes the acme threaded screws equivalent to square threads.	**[2M]**
j	What is distance raised/lowered for one complete revolution for compound screws made of two screws with same pitch (10mm).	**[3M]**

PART-B (50 MARKS)
SECTION-I

2	A 100 mm long and 60 mm diameter journal bearing supports a load of 2500 N at 600 r.p.m. If the room temperature is 20°C, what should be the viscosity of oil to limit the bearing surface temperature to 60°C? The diametral clearance is 0.06 mm and the energy dissipation coefficient based on projected area of bearing is 210 W/m^2/°C.	**[10M]**

OR

3	Select single row deep groove ball bearing for an application in which the radial load is 2000 N and axial is 1000N during 90 per cent of the time and radial of 8000 N with axial load of 5000N during the remaining 10 per cent. The shaft is to rotate at 150 r.p.m. Life of the bearing is 5000 hours. Also find the life of the selected bearing with 95% reliability.	**[10M]**

SECTION-II

4   A connecting rod is required to be designed for a high speed, four stroke I.C. **[10M]** engine. The following data are available.
Diameter of piston = 88 mm; Mass of reciprocating parts = 1.6 kg; Length of connecting rod (centre to centre) = 300 mm; Stroke = 125 mm; R.P.M. = 2200 (when developing 50 kW); Possible over speed = 3000 r.p.m.; Compression ratio = 6.8 : 1 (approximately); Probable maximum explosion pressure (assumed shortly after dead centre, say at about 3°) = 3.5 N/mm^2.

OR

5   Design a CI piston for a single acting four stroke petrol engine of the following **[10M]** specifications :
Cylinder bore = 100mm
Stroke Length =120mm
Maximum gas pressure = 5MPa
Break mean effective Pressure =0.65MPa
Fuel Consumption = 0.17kg/bhp/min
Speed =220rpm

SECTION-III

6   An open belt 100 mm wide connects two pulleys mounted on parallel shafts with **[10M]** their centres 2.4 m apart. The diameter of the larger pulley is 450 mm and that of the smaller pulley 300 mm. The coefficient of friction between the belt and the pulley is 0.3 and the maximum stress in the belt is limited to 14 N/mm width. If the larger pulley rotates at 120 r.p.m., find the maximum power that can be transmitted..

OR

7   Select a suitable wire rope for a vertical mine hoist to lift a load of 10 kN from 60 **[10M]** m deep. The rope should have a factor of safety equal to 6. The weight of the bucket is 5 kN. The load is lifted up with a maximum speed of 150 metres/min which is attained in 1 second.

SECTION-IV

8   A pair of 20° full-depth involute tooth spur gears is to transmit 30 kW at a speed **[10M]** of 250 r.p.m. of the pinion. The velocity ratio is 1 : 4. The pinion is made of cast steel having an allowable static stress, σo = 100 MPa, while the gear is made of cast iron having allowable static stress, σo = 55 MPa. The pinion has 20 teeth and its face width is 12.5 times the module. Determine the module, face width and pitch diameters of both the pinion and gear from the standpoint of strength only taking velocity factor into consideration.

OR

9   A pair of helical gears with 30° helix angle is used to transmit 15 kW at 10 000 **[10M]** r.p.m. of the pinion. The velocity ratio is 4 : 1. Both the gears are to be made of hardened steel of static strength 100 N/mm^2. The gears are 20° stub and the pinion is to have 24 teeth. The face width may be taken as 14 times the module. Find the module and face width from the standpoint of strength and check the gears for wear.

SECTION-V

10   A power screw having double start square threads of 25 mm nominal diameter and **[10M]** 5 mm pitch is acted upon by an axial load of 10 kN. The outer and inner diameters

of screw collar are 50 mm and 20 mm respectively. The coefficient of thread friction and collar friction may be assumed as 0.2 and 0.15 respectively. The screw rotates at 12 r.p.m. Assuming uniform wear condition at the collar and allowable thread bearing pressure of 5.8 N/mm^2, find: 1. the torque required to rotate the screw; 2. the stress in the screw; and 3. the number of threads of nut in engagement with screw.

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

11   A nut and screw combination having double start square threads nominal diameter 25 mm and pitch 5 mm subjected to axial load of 1000 N. The outer and inner diameter of the screw coller is 50 and 20 mm respectively. The coefficient of friction for collar thread and screw thread are 0.15 & 0.2 respectively. The screw rotates at 12 rpm. Assume uniform wear condition, and allowable bearing pressure is 5.77 N/mm^2. Determine,   **[10M]**
i) Power required to rotate the screw
ii)Stresses in screw Body & threads
iii)No. of threads of nut in engage with screw.

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MALLAREDDY COLLEGE OF ENGINEERING & TECHN
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular/supplementary Examinations, April/May 2019
Composite Materials
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.
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PART-A (25 Marks)

1). a   What are the drawbacks of polymer matrix composites?   **[2M]**
   b   Give four examples of naturally found composites. What are the constituents of these natural   **[3M]**
       composites?
   c   What are prepregs?   **[2M]**
   d   What is centrifugal casting process?   **[3M]**
   e   What are different types of mechanical testing methods in evaluation of composite materials? **[2M]**
   f   What is the rule of mixtures for composites?   **[3M]**
   g   What is a cross-ply laminate?   **[2M]**
   h   Differentiate lamina from laminate.   **[3M]**
   i   What are different adhesives used in joining method.   **[2M]**
   j   Name three advantages and three disadvantages of a pin-loaded hole joint.   **[3M]**

PART-B (50 MARKS)

SECTION-I

2   Explain various applications of composites in detail.   **[10M]**
OR
3   Compare the mechanical properties of ceramic matrix composites with the properties of metals. **[10M]**

SECTION-II

4   Explain Pultrusion process and filament winding for manufacture of composite materials.   **[10M]**
OR
5   Explain different types of bonding of fibre/matrix interface.   **[10M]**

SECTION-III

6   Explain the role of selection of fibres, in fibre reinforced composites.   **[10M]**
OR
7   Explain the calculation process of determining longitudinal and transversal stiffness of composite. **[10M]**

SECTION-IV

8   Describe the governing differential equation for a general laminate and also explain how to calculate   **[10M]**
    angle ply and cross ply in lamination.
OR
9   Derive Tsai-Hill and Tsai-Wu strength criteria for a composite lamina.   **[10M]**

SECTION-V

10 Show common types of adhesive joints with neat sketches and explain the possible failures in them.   **[10M]**
OR
11 What are the criteria for selection of adhesive based on the strength requirements?   **[10M]**
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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular/supplementary Examinations, April/May 2019
Finite Element Methods
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE
Questions, Choosing ONE Question from each SECTION and each Question carries 10
marks.   ***

PART-A (25 Marks)

1). a   What is meant by finite Element method   **[2M]**
   b   Name the weighted residual techniques?   **[3M]**

   c   Write down the expression of stiffness matrix for a truss element.   **[2M]**
   d   Define plane strain problem.   **[3M]**
   e   What is CST element?   **[2M]**
   f   Write down the shape functions for an axisymmetric triangular element.   **[3M]**
   g   Write the governing equation for a steady flow heat conduction.   **[2M]**
   h   Write down the expression of stiffness matrix for a beam element.   **[3M]**
   i   What is meant by discretization and assembling?   **[2M]**
   j   What is the difference between static and dynamic analysis?   **[3M]**

PART-B (50 MARKS)
SECTION-I

2   Describe advantages, disadvantages and applications of finite element analysis.   **[10M]**

OR

3   The following equation is available for a physical phenomena

$$\frac{d^2 y}{dx^2} -10x^2=5; \quad 0<x<1,$$ Boundary Conditions; y(0) =0, y(1) =0, Using Galarkin   **[10M]**

method of weighted residual find an approximate solution of the above differential
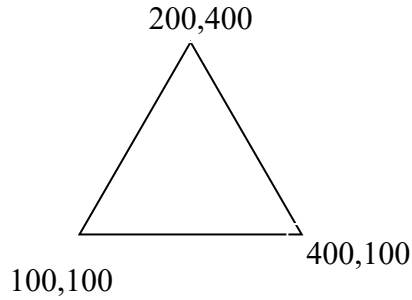equation.

SECTION-II

4   For the two bar truss shown in figure, determine the displacement at node 1 and   **[10M]**
stresses in element2, Take E=70GPa, A= 200mm^2.
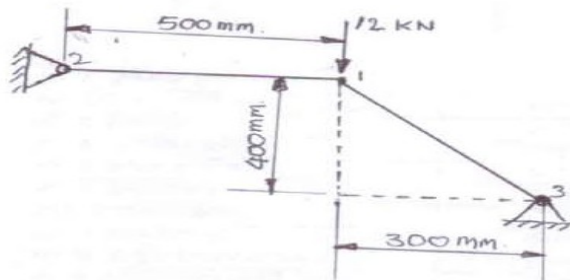
OR

5   For the plane stress element shown in figure the nodal displacements are   **[10M]**
U_1= 2.0mm, V_1=1.0mm
U_2= 1.0 mm,V_2= 1.5mm, U_3= 2.5mm,V_3=0.5mm, Take E= 210GPa, ν= 0.25,

t=10mm. Determine the strain-Displacement matrix [B].

200,400

100,100   400,100

SECTION-III

6   For axisymmetric element shown in figure, determine the strain-displacement matrix. Let $E = 2.1 \times 10^5 N/mm^2$ and $v = 0.25$. The co-ordinates shown in figure are in millimeters.

[10M]

Z

3   (0, 50)

2

1

(0, 0)   (50, 0)   r
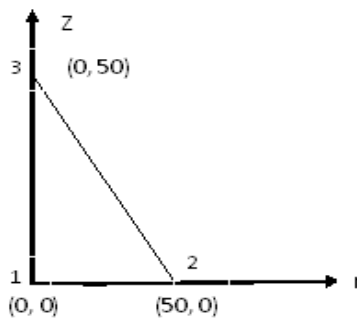
OR

7   Evaluate the following integral using Gaussian quadrature, so that the result is exact.

[10M]

$$f(r) = \int_{-1}^{1} (\frac{1}{1+x^2} + 2x - sinx) \, dx$$

SECTION-IV

8   Estimate the temperature distribution in a fin whose cross section is 15mm X 15mm and 500mm long. Take Thermal conductivity as 50W/m-k and convective heat transfer coefficient as 75 W/m^2-k at 25°C. The base temperature is assumed to be constant and its value may be taken as 900°C. And also calculate the heat transfer rate?
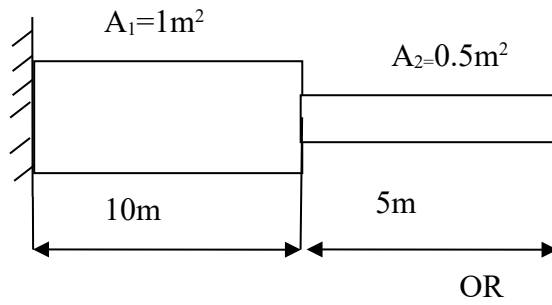
[10M]

OR

9   For the beam loaded as shown in figure, determine the slope at the simple supports. Take E=200GPa, $I=4 \times 10^6 m^4$.

24kN/m

[10M]
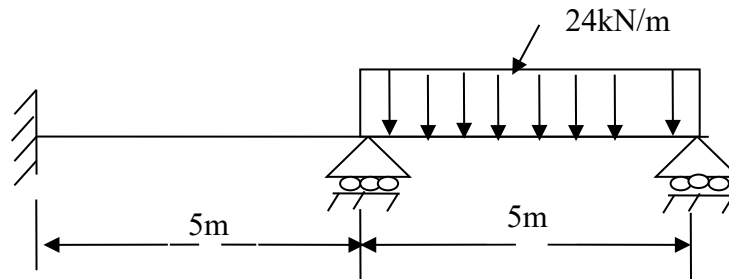
5m   5m

SECTION-V

10   Determine the Eigen values and Eigen vectors for the beam shown in figure

$E=30x10^5N/m^2$
$\rho=0.283kg/m^3$

[10M]

OR

11   Write short note on   **[10M]**
    (a) Eigen vectors for a stepped beam
    (b) Evaluation of Eigen values.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Regular/supplementary Examinations, April/May 2019
Heat Transfer
(ME)

Roll No										

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

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

Heat and mass transfer data books are permitted.
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PART – A   (25 Marks)

1. (a) State Fourier's law of heat conduction. Why negative sign is used? **(2M)**
   (b) What is lumped heat capacity method? Explain. **(3M)**
   (c) Differentiate between natural and forced convection **(2M)**
   (d) What is the significance of non dimensional numbers **(3M)**
   (e) State Stefan Boltzmann's law **(2M)**
   (f)) What are the various radiation properties **(3M)**
   (g) What is NTU method of a heat exchanger. **(2M)**
   (h) What are the differences between film wise and drop wise condensation. **(3M)**
   (i) List some industrial and day-to-day applications of mass transfer **(2M)**
   (j) State Fick's law of diffusion. What are its limitations? **(3M)**

PART – B   (50 Marks)

SECTION – I

2. A furnace wall is built up of two layers laid of fireclay 12cm thick and red brick 25 cm thick while the annular space between the two is filled with diatomite brick (15cm). What should be the thickness of the red brick layer if the wall is to be constructed without diatomite brick, so that the heat flow through the wall remains constant? The thermal conductivities of fireclay, diatomite and red brick being 0.929, 0.129 and 0.699 W/m^{0}c respectively. **(10M)**

(OR)

3. Derive the general heat conduction equation in Spherical coordinates. **(10M)**

SECTION – II

4. Determine the heat transfer rate by free convection from a plate 0.3m × 0.3m for which one surface is insulated and the other surface is maintained at 110^{0}C and exposed to atmosphere air at 30^{0}C for the following arrangements:
   a) The plate is vertical
   b) The plate is horizontal with the heating surface facing up
   c) The plate is horizontal with the heating surface facing down. **(10 M)**

(OR)

5. Derive the expression for boundary layer thickness for free convection heat transfer on a vertical flat plate. **(10M)**

SECTION – III

6. (a). Explain what do you mean by absorptivity, reflectivity and transmissivity **(5M)**
   |(b). Obtain the expression for blackbody radiation **(5M)**

(OR)

7. Two parallel plate 3m × 2m are spaced at 1m apart one plate is maintained at $500\,^0C$ and other at $200\,^0C$. The emissivity of the plates are 0.3 and 0.5. The plates are located in a large room and room walls are maintained at $40\,^0C$. If the plates exchange heat with each other and with the room, find the heat lost by the hotter plate. **(10M)**

SECTION – IV

8. (a) Derive an expression for effectiveness of counter flow heat exchanger. **(5M)**
   (b) Explain about the Regime's of boiling with a neat sketch. **(5M)**

(OR)

9. (a) Derive the expression for LMTD in a parallel flow double pipe heat exchanger **(5M)**
   (b) A hot fluid enters a heat exchanger at a temperature of $200\,^0C$ at a flow rate of 2.8 kg/sec (sp. heat 2.0 kJ/kg-K) it is cooled by another fluid with a mass flow rate of 0.7 kg/sec (Sp. heat 0.4 kJ/kg-K). The overall heat transfer coefficient based on outside area of 20 m2 is 250 W/m^2-K.Calculate the exit temperature of hot fluid when fluids are in parallel flow.**(5M)**

SECTION – V

10. (a) Derive the equation for mass transfer coefficient. **(5M)**
    (b) Derive an expression for Fick's law of diffusion. **(5M)**

(OR)

11. (a) Explain the various modes of mass transfer **(5M)**
    (b) Define various concentrations, velocities and fluxes in mass trasnfer **(5M)**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, December 2019
Refrigeration and Air Conditioning
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.

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Part- A (25 Marks)

Q. No. 1.
a. Define the term "ton of refrigeration". **[2M]**
b. 'A completely odourless refrigerant is not desirable', discuss the statement.   **[3M]**
c. Give the advantages of hermetic sealed compressor? **[2M]**
d. Represent ideal vapour compression refrigeration system on T-S diagram. **[3M]**
e. Define entrainment efficiency in steam jet refrigeration system. **[2M]**
f. What are the refrigerant and absorbent in Li-Br and water absorption system? **[3M]**
g. Write psychometric properties of air. **[2M]**
h What is the need of Ventilation? **[3M]**
i. What is the function of a humidifier?   **[2M]**
j. Distinguish clearly fan and blower.   **[3M]**

Part-B (50 Marks)
SECTION-I

Q. No.2) List the commonly used refrigerants in practice and explain in detail desirable chemical
properties of refrigerants. **[10M]**

OR

Q. No. 3) With a neat sketch explain the working of Bell-Coleman cycle and derive the
expression for its COP. **[10M]**

SECTION-II

Q. No. 4) State merits and demerits of 'Vapor compression system' over' Air-refrigeration
system' **[10M]**

OR

Q. No. 5) Explain losses in Vapour Compression Refrigeration system and their effects. **[10M]**

SECTION-III

Q. No. 6) Explain with help of neat sketches, vapour absorption cycle for refrigeration. How
is it different from vapour compression refrigeration system. **[10M]**

OR

Q. No. 7) In an absorption type refrigerator, the heat is supplied to NH3 generator by condensing
steam at 2 bar and 900C dry. The temperature to be maintained in the refrigerator is –
50C. The temperature of the atmosphere is 300C. Find the maximum C.O.P. is 70% of
the refrigerator. If the refrigeration load is 20 tons and actual C.O.P. is 70% of
maximum C.O.P. Find the mass of steam required per hour. **[10M]**

SECTION-IV

Q. No. 8) Sketch the psychrometric chart and represent the different psychrometric properties on
the same. **[10M]**

OR

Q. No. 9) Using psychrometric chart, explain the method of cooling and dehumidification process and how do you get them practically? **[10M]**

Q. No. 10) Define the term `` effective temperature `` and explain its importance in air conditioning system. Describe the factors which affect effective temperature. **[10M]**

OR

Q. No. 11) Explain different filters and grills with the help of line diagrams and their working. **[10M]**

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Code No: **R15A0327**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, December 2019

Composite Materials

(ME)

Roll No									

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.

***

PART-A (25 Marks)

1). a	Classify the various types of Composite materials	**[2M]**
b	Write the applications of ceramic and polymer matrix composite materials	**[3M]**
c	What are the various Manufacturing methods of composites	**[2M]**
d	Explain filament winding of making a composite materials	**[3M]**
e	List the characteristics of matrix material.	**[2M]**
f	What are the advantages of composite materials?	**[3M]**
g	What is laminate and how it is classified?	**[2M]**
h	Write transformation matrix for an angle-ply matrix	**[3M]**
i	What are various failure theories?	**[2M]**
j	Write the various engineering applications of composites.	**[3M]**

PART-B (50 MARKS)

SECTION-I

2	a) What are metal – matrix composites? Discuss their important properties and applications.	**[5M]**
	b) Differentiate between natural and non – made composites.	**[5M]**

OR

3	Explain the classification of composite materials?	**[10M]**

SECTION-II

4	Explain Hand layup technique with a neat diagram, with its merits and demerits	**[10M]**

OR

5	Explain Pultrusion technique with a neat diagram, with its merits and demerits	**[10M]**

SECTION-III

6	Define weight and volume fraction of unidirectional continuous fibres of a composite material.	**[10M]**

OR

7	Deduce a relation between on-axis and off-axis stress transformations for a unidirectional lamina.	**[10M]**

SECTION-IV

8	Derive the governing differential equations for a symmetric cross ply laminated plate.	**[10M]**

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

9   Reduce the monoclinic stress–strain relationships to those of an orthotropic material   **[10M]**

<div align="center">

SECTION-V

</div>

10   Write the advantages and disadvantages of adhesive and mechanically fastened joints   **[10M]**

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

11   Explain the various joining methods of composite materials and its exclusive applications   **[10M]**

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

Code No: **R15A0322**

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, December 2019
Finite Element Method
(ME)

Roll No									

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.
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PART-A (25 Marks)

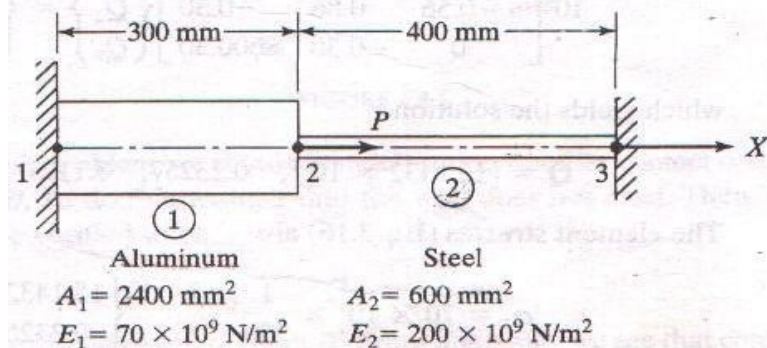|		
1). a	What is meant by Engineering analysis and specify its Types	**[2M]**
b	Explain finite element method?	**[3M]**
c	Draw a plane truss structure.	**[2M]**
d	What are the characteristics of a truss?	**[3M]**
e	Define shape function.	**[2M]**
f	List any four two dimensional elements.	**[3M]**
g	What is Fourier's law?	**[2M]**
h	Discuss the types of heat transfer	**[3M]**
i	What is consistent mass matrix?	**[2M]**
j	Define Eigen values?	**[3M]**

PART-B (50 MARKS)
SECTION-I

2	Explain the concept of FEM briefly and outline the steps involved in FEM along with remembers.	**[10M]**

OR

3	Consider the following fig. An axial load P=200 KN is applied as shown. Using penalty approach for handling boundary conditions, do the following a) Determine the nodal displacements. b) Determine the stress in each material. c) Determine the reaction forces.	**[10M]**

$$A_1 = 2400\ mm^2 \qquad A_2 = 600\ mm^2$$
$$E_1 = 70 \times 10^9\ N/m^2 \qquad E_2 = 200 \times 10^9\ N/m^2$$

Aluminum   Steel
300 mm   400 mm

SECTION-II

4   For the two-bar truss shown in Figure below, determine the nodal **[10M]** displacements, element stresses and support reactions. A force of P=1000kN is applied at node-1. Assume E=210GPa and A=600mm^2 for each element.
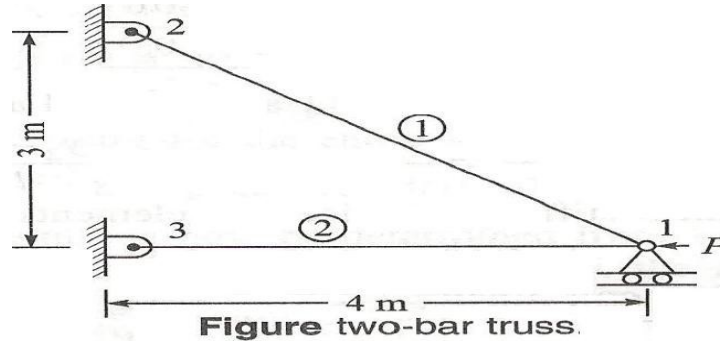

Figure two-bar truss.

OR

5   a).Explain Iso-parametric, sub-parametric and super- parametric elements   **[6M]**
    b) Advantages of iso-parametric elements   **[4M]**

SECTION-III

6   Explain the concept of numerical integration and its utility in generating **[10M]** Isoperimetric finite element matrices.

OR

7   For the point P located inside the triangle, the shape functions N_1 and N_2 are **[10M]** 0.15 and 0.25, respectively. Determine the x and y coordinates of P.
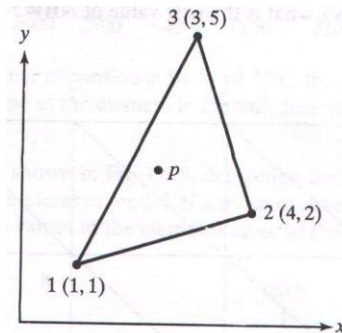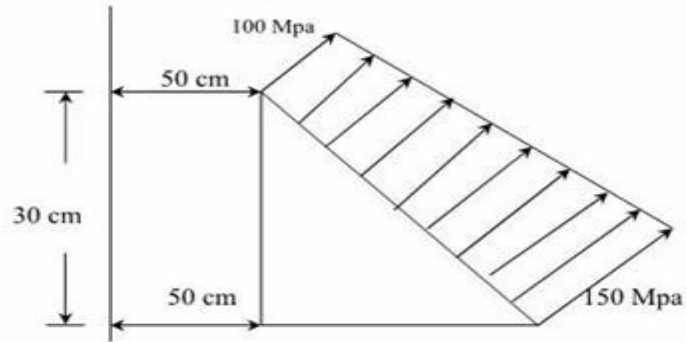

SECTION-IV

8   Estimate the temperature profile in **a** fin of diameter 25 mm, whose length is **[10M]** 500mm. The thermal conductivity of the fin material is 50 W/m K and heat transfer coefficient over the surface of the fin is 40 W/m^{2}K at 30^{0}C. The tip is insulated and the base is exposed to a temperature of 150 ^{0}C. Evaluate the temperatures at points separated by 100 mm each.

OR

9   An axi-symmetric triangular element is subjected to the loading as shown in fig. **[10M]** the load is distributed throughout the circumference and normal to the boundary. Derive all the necessary equations and derive the nodal point loads.
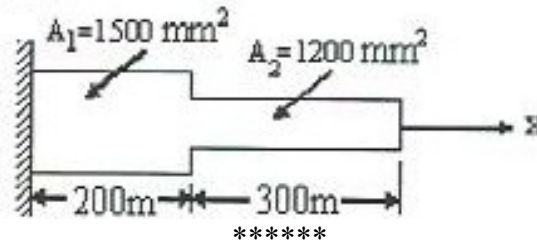
SECTION-V

10   Explain the following with examples: **[10M]**
      a) Lumped mass matrix. b) Types of vibrations.

<center>OR</center>

11   Determine the natural frequencies and mode shapes of a stepped bar shown in   **[10M]**
      figure below. Assume E=300GPa and density is 7800 Kg/m^3.

<center>******</center>

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH⬚GY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, December 2019
Heat Transfer
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.
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PART-A (25 Marks)

1). a   What is the convection mode of heat transfer?   **[2M]**
   b   What are the initial and final boundary conditions for conduction of heat transfer?   **[3M]**

   c   What is Buckingham's Π theorem?   **[2M]**
   d   Define an ideal fluid and a real fluid.   **[3M]**
   e   What is the concept of shape factor?   **[2M]**
   f   Define Stefan Boltzmann constant.   **[3M]**
   g   Describe the selection criteria of heat exchanger.   **[2M]**
   h   What is fouling factor?   **[3M]**
   i   Explain the Conservation laws   **[2M]**
   j   What is Mass transfer coefficient.   **[3M]**

PART-B (50 MARKS)
SECTION-I
2   Derive the heat conduction equation in Cartesian coordinates.   **[10M]**
                                                             OR
3   A Stainless steel plate is of 2 cm thick is maintained at a temperature of $550\,^0C$ at   **[10M]**
one face and $50\,^0C$ on the other. The thermal conductivity of stainless steel at
$300\,^0C$ is 19.1 W/m K. Calculate the heat transferred through the material per unit
area.

SECTION-II
4   A plate 20cm height and 1m wide is placed in air at $20\,^0C$. If the surface of the   **[10M]**
plate is maintained at $100\,^0C$ calculate the boundary layer thickness and local heat
transfer coefficient at 10 cm from the leading edge. Also calculate the average
heat transfer coefficient over the entire length of the plate.
                                                             OR
5   Air at $30\,^oC$ is flows with a velocity of 2.8m/s over a plate   **[10M]**
1000mm(length)x600mm(width)x 25mm(thick).The surface of the plate is
maintained at $90\,^oC$.If the thermal conductivity of the plate material is 25W/m^oC,
calculate:
(i) Heat loss by the plate.
(ii) Bottom temperature of the plate for the steady state condition.
The thermo-physical properties of air at mean film temperature $(90+30)/2=60\,^oC$

are: $\rho=1.06kg/m^3$, $c_p=1.005kj/kgK$, $k=0.02894W/m°C$, $\nu=18.97\times10^{-6}m^2/s$, Pr=0.696.

SECTION-III

6   A vertical cylinder 1.5M height and 180 mm in dia is maintained at 100^0C in and **[10M]** atmospheric environment of 20^0C , calculate the heat loss by the free convection from the surface of the cylinder.

OR

7   Two parallel plate 3m × 2m are spaced at 1m apart one plate is maintained at **[10M]** 500^0C and other at 200^0C. The emissivity of the plates are 0.3 and 0.5. The plates are located in a large room and room walls are maintained at 40^0C. If the plates exchange heat with each other and with the room, find the heat lost by the hotter plate.

SECTION-IV

8   Derive an expression for LMTD in case of a counter - flow heat exchanger.   **[10M]**

OR

9   The flow rates of hot and cold water streams running through a parallel flow heat **[10M]** exchanger are 0.2 kg/s and 0.5 kg/s respectively. The inlet temperatures on the hot and cold sides are 75°C and 20°C respectively. The exit temperature of hot water is 45°C. If the individual heat transfer coefficients on both sides are 650 W/m² °C, calculate the area of the heat exchanger.

SECTION-V

10   a)   Enumerate applications of mass transfer.   **[5M]**
      b)   Explain about convective mass transfer and mass transfer coefficient.   **[5M]**

OR

11   An open pan of 20 cm diameter and 8 cm depth contains water at 250C and is **[10M]** exposed to dry atmospheric air. Assuming the rate of diffusion of water as 8.54 x l0-4 kg/h, calculate the time required for all the water to evaporate. .

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH____GY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, December 2019
Machine Design - II
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.

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PART-A (25 Marks)

1). a	What are journal bearings? Give a classification of these bearings	**[2M]**
b	Where are the angular contact and self-aligning ball bearings used?	**[3M]**
c	Under what force, the big end bolts and caps are designed?	**[2M]**
d	At what angle of the crank, the twisting moment is maximum in the crankshaft?	**[3M]**
e	What are the factors upon which the coefficient of friction between the belt and the pulley depends?	**[2M]**
f	List and discuss briefly the factors that control the power transmission capacity of a belt.	**[3M]**
g	Explain the phenomenon of interference in involute gears. What are the conditions to be satisfied in order to avoid interference ?	**[2M]**
h	Explain the following terms used in helical gears : (a) Helix angle; (b) normal pitch; and (c) axial pitch.	**[3M]**
i	What are the advantages of multiple-start screws?	**[2M]**
j	How will you designate trapezoidal threads?	**[3M]**

PART-B (50 MARKS)
SECTION-I

2   A full journal bearing of 50 mm diameter and 100 mm long has a bearing pressure   **[10M]**
of 1.4 N/mm2. The speed of the journal is 900 r.p.m. and the ratio of journal
diameter to the diametral clearance is 1000. The bearing is lubricated with oil
whose absolute viscosity at the operating temperature of 75°C may be taken as
0.011 kg/m-s. The room temperature is 35°C. Find : 1. The amount of artificial
cooling required, and 2. The mass of the lubricating oil required, if the difference
between the outlet and inlet temperature of the oil is 10°C. Take specific heat of
the oil as 1850 J / kg / °C.

OR

3   A shaft rotating at constant speed is subjected to variable load. The bearings   **[10M]**
supporting the shaft are subjected to stationary equivalent radial load of 3 kN for
10 per cent of time, 2 kN for 20 per cent of time, 1 kN for 30 per cent of time and
no load for remaining time of cycle. If the total life expected for the bearing is 20
× 106 revolutions at 95 per cent reliability, calculate dynamic load rating of the
ball bearing.

SECTION-II

4. Design a connecting rod for an I.C. engine running at 1800 r.p.m. and developing a maximum pressure of 3.15 N/mm2. The diameter of the piston is 100 mm ; mass of the reciprocating parts per cylinder 2.25 kg; length of connecting rod 380 mm; stroke of piston 190 mm and compression ratio 6 : 1. Take a factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and the corresponding bearing pressures as 10 N/mm2 and 15 N/mm2. The density of material of the rod may be taken as 8000 kg/m3 and the allowable stress in the bolts as 60 N/mm2 and in cap as 80 N/mm2. The rod is to be of I-section for which you can choose your own proportions. Draw a neat dimensioned sketch showing provision for lubrication. Use Rankine formula for which the numerator constant may be taken as 320 N/mm2 and the denominator constant 1 / 7500.   **[10M]**

OR

5. Design a cast iron piston for a single acting four stroke engine for the following data: **[10M]**
Cylinder bore = 100 mm ; Stroke = 125 mm ; Maximum gas pressure = 5 N/mm2 ; Indicated mean effective pressure = 0.75 N/mm2 ; Mechanical efficiency = 80% ; Fuel consumption = 0.15 kg per brake power per hour ; Higher calorific value of fuel = 42 × 103 kJ/kg ; Speed = 2000 r.p.m. Any other data required for the design may be assumed.

SECTION-III

6. An open belt 100 mm wide connects two pulleys mounted on parallel shafts with their centres 2.4 m apart. The diameter of the larger pulley is 450 mm and that of the smaller pulley 300 mm. The coefficient of friction between the belt and the pulley is 0.3 and the maximum stress in the belt is limited to 14 N/mm width. If the larger pulley rotates at 120 r.p.m., find the maximum power that can be transmitted.   **[10M]**

OR

7. A compressor, requiring 90 kW, is to run at about 250 r.p.m. The drive is by V-belts from an electric motor running at 750 r.p.m. The diameter of the pulley on the compressor shaft must not be greater than 1 metre while the centre distance between the pulleys is limited to 1.75 metre. The belt speed should not exceed 1600 m / min. Determine the number of V-belts required to transmit the power if each belt has a crosssectional area of 375 mm2, density 1000 kg / m3 and an allowable tensile stress of 2.5 MPa. The groove angle of the pulleys is 35°. The coefficient of friction between the belt and the pulley is 0.25. Calculate also the length required of each belt.   **[10M]**

SECTION-IV

8. The following particulars of a single reduction spur gear are given : Gear ratio = 10 : 1; Distance between centres = 660 mm approximately; Pinion transmits 500 kW at 1800 r.p.m.; Involute teeth of standard proportions (addendum = m) with pressure angle of 22.5°; Permissible normal pressure between teeth = 175 N per mm of width. Find : 1. The nearest standard module if no interference is to occur; 2. The number of teeth on each wheel; 3. The necessary width of the pinion; and 4. The load on the bearings of the wheels due to power transmitted.   **[10M]**

OR

9   A pair of helical gears with 30° helix angle is used to transmit 15 kW at 10 000   **[10M]**
    r.p.m. of the pinion. The velocity ratio is 4 : 1. Both the gears are to be made of
    hardened steel of static strength 100 N/mm2. The gears are 20° stub and the pinion
    is to have 24 teeth. The face width may be taken as 14 times the module. Find the
    module and face width from the standpoint of strength and check the gears for
    wear.

SECTION-V

10 A double-threaded power screw, used for lifting a load, has a nominal diameter of   **[10M]**
    30 mm and a pitch of 6 mm. The coefficient of friction at the screw threads is 0.1.
    Neglecting collar friction, calculate: (i) efficiency of the screw with square
    threads; and (ii) efficiency with Acme threads (2q = 29°).

OR

11   A 50 kN capacity screw jack consists of a square-threaded steel screw meshing   **[10M]**
    with a bronze nut. The nominal diameter is 60 mm and the pitch is 9 mm. The
    permissible bearing pressure at the threads is 10 N/mm2. Calculate: (i) the length
    of the nut; and   (ii) the transverse shear stress in the nut.

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH ̄ ̄GY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, December 2019
Production and Operations Management
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question from each SECTION and each Question carries 10 marks.
***
PART-A (25 Marks)

1). a	Define production management.	**[2M]**
b	What are the different decisions taken in production and operations management?	**[3M]**
c	Explain any two objectives of sequencing.	**[2M]**
d	Would the line balancing technique be more useful to the General Manager (Production) or to a Plant Superintendent? Explain.	**[3M]**
e	List out the advantages of quality circles.	**[2M]**
f	What information does the OC curve provide?	**[3M]**
g	Outline the different sources of supply of materials?	**[2M]**
h	Infer any three techniques for prioritization of materials.	**[3M]**
i	What is the purpose of Inventory?	**[2M]**
j	Define the term inventory?	**[3M]**

PART-B (50 MARKS)
SECTION-I

2   How does the production and operations management function distinguish itself **[10M]**
from the other functional areas?

OR

3   List and briefly discuss different phases of production planning and control.   **[10M]**

SECTION-II

4   Explain the types of layouts in detail.   **[10M]**

OR

5   List and explain all the factors that affect the location of a plant. Further explain **[10M]**
the factors which could affect the locational decision to set up a refinery unit in
Punjab.

SECTION-III

6   The data shows the sample mean and range for 10 samples for size 5 each. Find   **[10M]**
and plot the control limits for mean chart and range chart.

Sample	1	2	3	4	5	6	7	8	9	10
Mean	21	26	23	18	19	15	14	20	16	10
Range	5	6	9	7	4	6	8	9	4	7

OR

7   What are objectives of work measurement? Also discuss its different methods in detail.   **[10M]**

SECTION-IV

8   Differentiate between MRP1 and MRP2   **[10M]**

OR

9   What is materials budgeting? State the factors governing drawing up of a materials budget.   **[10M]**

SECTION-V

10   What is the use of ABC, VED and other classifications to departments other than Inventory control? What is the use for Purchasing, for Maintenance, for Quality control?   **[10M]**

OR

11   Write about waste management and explain types of inventory.   **[10M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2021
Refrigeration and Air Conditioning
(ME)

Roll No										

Time: 2 hours 30 min   **Max. Marks: 75**

Answer Any **Five** Questions
All Questions carries equal marks.
****

1. An air refrigerator working on bell coleman cycle takes the air into the compressor at 1 bar and -7^0 C and it is compressed isentropically to 5.5 bar and it is further cooled to 18^0C at the same pressure. It is then expended in an expansion cylinder to 1 bar and then it is discharged into the refrigerating chamber. Find the COP of the system if (i) the expansion is isentropic (ii) the expansion follows the law $PV^{1.25}$=constant. Take γ as 1.4 and cp=1KJ/kg. **[15M]**

2. a)Discuss factors to be considered in the selection of refrigerants **[8M]**
   b) What are the desirable properties of a good refrigerants **[7M]**

3. a) Explain the simple vapour compression cycle with the help of T-S and P-h chart. **[7M]**
   b) Derive the expression for COP of vapour compression cycle from T-s chart when the refrigerant is dry saturated before compression **[8M]**

4. a)Differentiate between vapor absorption refrigeration system and vapor compressor refrigeration system **[7M]**
   b) Explain components of simple vapour compression refrigeration system **[8M]**

5. How does a vapour absorption system produce cooling? Describe its components**[15M]**

6. Explain psychometric relations in detail **[15M]**

7. Write down factors governing optimum effective temperature **[15M]**

8. Explain heat pump circuit .write down different heat pump circuits briefly **[15M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2021
Composite Materials
(ME)

Roll No										

Time: 2 hours 30 min   **Max. Marks: 75**

Answer Any **Five** Questions
All Questions carries equal marks.
*****

1. a) What are the various types of composites? Explain them briefly [7M]
   b) What are the advantages and disadvantages of ceramic matrix composites over carbon carbon matrix composites? [8M]

2. a) Describe the present applications metal matrix composites. Their future potential and research applications [7M]
   b)what are the draw backs of polymer matrix composites? [8M]

3. Discuss the preparation of following: [15M]
   a) Glass fibers   b)carbon fibers   c) Kevlar fiber

4. Discuss the failure mechanisms of a unidirectional lamina. [15M]

5. Show that from generalized hooke's law that an orthotropic material has 9 independent constants and deduce it to an orthotropic lamina [15M]

6. A graphite /epoxy unidirectional lamina is subjected to σ_1=2MPa, σ_2=3MPa, τ_{12}=4MPa and material constants are E_1=181GPa, E_2=10.3GPa, G_{12}=7.17GPa Find the a)Stiffness matrix b)Compliance matrix c)strains[15M]

7. a)what are the special cases of laminates [7M]
   b) Explain about classifications of Laminates[8M]

8. a)Explain about joining method in composite materials[7M]
   b) explain any one of the failure theory in composite materials[8M]

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Code No: **R15A0322**

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)
**III B.Tech II Semester Supplementary Examinations, February 2021**
Finite Element Method
(ME)

Roll No										

**Time: 2 hours 30 min**   **Max. Marks: 75**

Answer Any **Five** Questions
All Questions carries equal marks.
***

1   a   Enumerate the generalized procedure involved in Finite Element Method   **[10M]**

      b   Discuss the different engineering applications of Finite Element Method   **[05M]**

2   For the vertical bar shown in figure, find the deflection at 'A' and the stress   **[15M]**
            distribution. Use E=150MPa and P=100 KN .

A
Area=2000cm^2

15cm   P

Area=1000cm^2

8cm
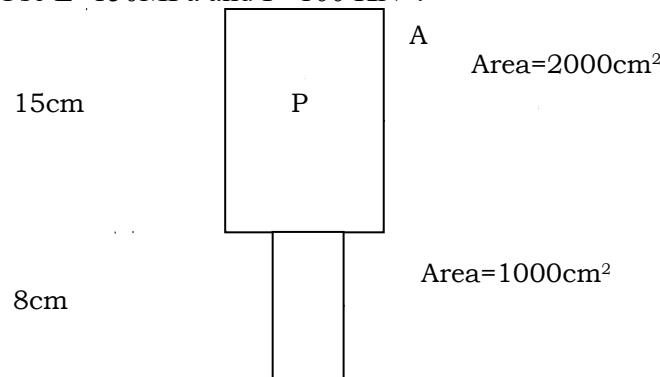
3   Consider the plane truss shown in figure, determine the nodal displacements,   **[15M]**
            Element forces and support reactions. Take E=2X10^5 N/mm^2; A= 1500mm^2.

20kN   10kN

2000mm

3000mm
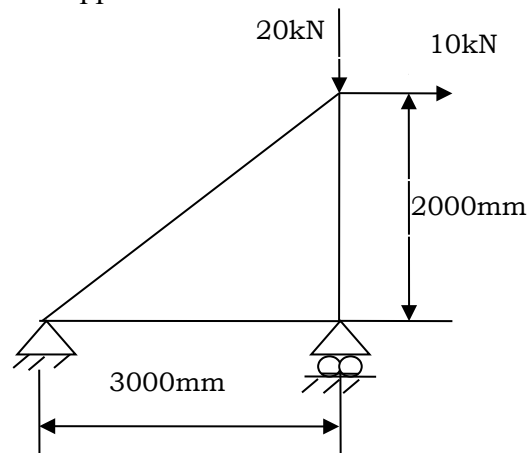
4   Compute Nodal displacement matrix for the three noded triangular element   **[15M]**
            shown in figure and also determine the element strains, if the nodal
            displacements are given as

U₁= 0.002 cm   V₁= 0.001cm   E=200 Gpa & υ = 0.25

$U_1= 0.002$ cm $V_1= 0.001$cm   E=200 Gpa & $\upsilon = 0.25$
$U_2= 0.001$ cm $V_2= -0.004$ cm
$U_3= -0.003$ cm $V_3= 0.007$ cm
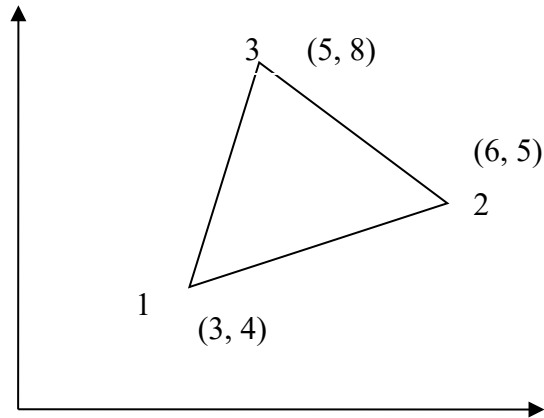
5   For axi-symmetric element shown in figure, determine the stiffness matrix. Let **[15M]** $E = 2.1 \times 10^5 \text{N/mm}^2$ and $\upsilon = 0.25$. The co-ordinates shown in figure are in millimeters.
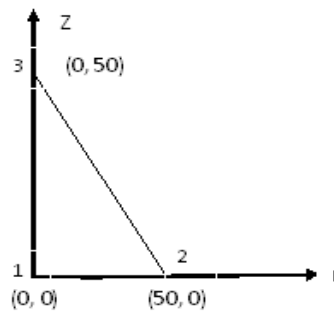
6   Derive the stiffness matrix for a four noded isoparametric quadrilateral element. **[15M]**

7   Estimate the temperature distribution in a fin whose cross section is **[15M]** 10mmx10mm and 500mm long. Take thermal conductivity as 50W/m-k and convective heat transfer coefficient as 75W/m²k at 25°C. The base temperature is assumed to be constant and its value may be taken as 900°C. And also calculate heat transfer rate?

8   a Distinguish between lumped mass and consistent mass matrices **[06M]**
     b Derive the consistent mass matrix for an one dimensional bar element. **[09M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECH──GY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2021
### Heat Transfer
(ME)

Roll No										

Time: 2 hours 30 min   **Max. Marks: 75**

Answer Any **Five** Questions
All Questions carries equal marks.
***

1	a) Define Heat transfer? Explain with examples	**[5M]**
	b) Derive an expression for heat Transfer through Cylindrical Co-ordinates	**[10M]**
2	a) Define Fin efficiency and effeteness	**[5M]**
	b) A Circumferential aluminium Fin of 1mm thick and 1.5cm long are soldered to 2.5 cm OD of pipe. The fin base temperature is 170^0 C and ambient fluid temperature 25^0C. Estimate the heat loss per fin. The heat transfer coefficient h taken as 130 W/m^{2}K	**[10M]**
3	a) State Newton's law of heating and cooling process	**[3M]**
	b) A stainless steel rod of OD 1cm originally at a temperature of 320^0C is suddenly immersed in a liquid at 120^0C for which convection heat transfer coefficient h=100 W/m^{2}K. Determine the time period, and determine the time required by the rod to reach a temperature of 200^0C.	**[12M]**
4	a) What is the use of Heisler charts?	**[3M]**
	b) A long steel cylinder of 120mm OD initially at 20^0C and placed in a furnace of 800^0C with h=140 W/m^2 K. Determine i) Time for axis to reach 700^0C ii) Corresponding temperature at a radius of 45mm at that time .iii) Total Heat flow from cylinder up to per hour.	**[12M]**
5	a) What is the difference between forced and natural convection.	**[3M]**
	b) Derive an expression for free convection in terms of Grashof, Nusselt and Prandtl number.	**[12M]**
6 Ca	Calculate the shape factor F_{1-4} for the figure shown below	**[15M]**
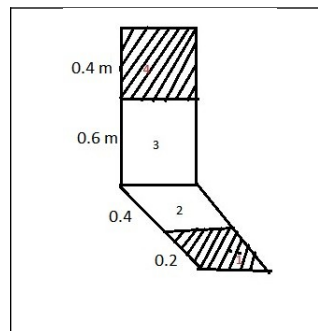
7	A Refrigerator is designed to cool 250 kg/hr hot fluid of specific heat 3350 J/kg^{0}K at 120^0C using a parallel flow arrangement. 1000 kg/hr of cooling purpose at a temperature of 10^0C. U= 1160 w/m^{2}k and the surface area of the	**[15M]**

heat exchanger is 0.25 m², calculate the outlet temperature of the cooling liquid and water. Also the Effectiveness of the heat exchanger.

8   a) Enumerate applications of Mass Transfer   **[7M]**

        b) State Fick's law of diffusion and write its limitations.   **[8M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2021
Machine Design - II
(ME)

Roll No										

Time: 2 hours 30 min   **Max. Marks: 75**

Answer Any **Five** Questions
All Questions carries equal marks.
***

1	a. Define the term dynamic load carrying capacity of the bearing.	**[03M]**
	b. Select a suitable bearing for a drilling machine spindle of diameter 40mm rotating at 3000 rpm. It is subjected to a radial load of 2000N and axial load of 1000N. It is to work 45 hours a week for one year.	**[12M]**
2	Design a journal bearing for a 9k, 5 rps compressor. Load rating on the journal is 10kN. Shaft material is C40 steel, length of the journal 90mm.	**[15M]**
3	Design a connecting rod for a single acting internal combustion engine that runs at 600 rpm and develops a maximum pressure of 3.4MPa. Other particulars of the engine are 140mm bore, 190mm stroke and length of the connecting rod 380mm. The weight of the reciprocating parts may be taken as 4kg. The connecting rod is made up of an alloy steel 37Mn2. Take l/d ratio for the crank pin as 1.5and the corresponding bearing pressure as 10MPa. Take allowable stresses in bolts as 60MPa and in cap as 80MPa. Draw a neat dimensional sketch of the connecting rod designed.	**[15M]**
4	Explain the detailed design procedure of Trunk type Piston.	**[15M]**
5	a. What are the advantages of Rope drive?	**[02M]**
	b. A rope drive is used for transmitting 250kW at 300 rpm of a pulley of diameter 1.2m. The angle of lap is 180° and the groove angle is 45°. The ropes to be used are 50 mm in diameter. The mass of the rope is 1.3kg/meter length and each rope has a maximum pull of 2200 N, the coefficient of friction between the rope and pulley is 0.3. Determine the number of ropes required.	**[13M]**
6	a. What is the function of the spring?	**[02M]**
	b. At the bottom of a mine-shaft a group of 16 identical helical springs are set in parallel to absorb the shock caused by the falling cage in case of failure. The cage with load weighs 80kN and the counter weight weighs 20kN. If the loaded cage falls through a height of 50m from rest, find the maximum stress induced in each spring. Take d= 50mm, C=6, n=20 and G= 0.8×10^5 N/mm^2.	**[13M]**
7	a. List out various types of gear materials.	**[02M]**
	b. Design a spur gear to transmit a 1.5kW at 1440 rpm from an electric motor to an air compressor running at 720 rpm. Take working life as 10,000 hrs.	**[13M]**
8	a. With a neat sketch explain the working principle of Compound Screw.	**[08M]**
	b. A double threaded power screw, with ISO metric trapezoidal threads is used to raise a load of 300kN. The nominal diameter is 100mm and the pitch is 12mm. The coefficient of friction at the screw thread is 0.15. Neglecting the collar friction. Calculate i) Torque required to raise the load ii) Efficiency of the screw.	**[07M]**

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2021
Production and Operations Management
(ME)

Roll No										

Time: 2 hours 30 min   **Max. Marks: 75**

Answer Any **Five** Questions
All Questions carries equal marks.
***

1. Define Production planning and control. Explain the various functions of Production planning and control.**[15M]**

2. What is product life cycle? State the interrelation between the product life cycle and process life cycle. **[15M]**

3. What is aggregate Planning? Explain the strategies of aggregate planning in detail. **[15M]**

4. What is Group Technology? Explain salient features of group technology and mention the reasons for preferring it. **[15M]**

5. Explain the O. C Curve with all its parameters. **[15M]**

6. Define method study. Write the objectives, approaches and benefits of method study concept. **[15M]**

7. Define waste management? What are the main objectives and components of waste management? Explain. **[15M]**

8. Explain the terms
   a) ABC Analysis **[8M]**   and   b) VED Analysis**[7M]**

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Code No: R15A0324

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH[R15]GY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2022
Refrigeration and Air Conditioning
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question From each SECTION and each Question carries 10 marks.
***
PART-A (25 Marks)

1). a	What is refrigeration? Define one ton of refrigeration.	**[2M]**
b	Discuss the advantages of the dense air refrigerating system over an open air refrigeration system	**[3M]**
c	Mention the advantages of vapour compression refrigeration system over air refrigeration system	**[2M]**
d	Why in practice a throttle valve is used in vapour compression refrigerator rather than an expansion cylinder to reduce pressure between the condenser and the evaporator?	**[3M]**
e	Describe COP briefly	**[2M]**
f	State the function of absorber and rectifier in vapour absorption system.	**[3M]**
g	What is the difference between wet bulb temperature and thermodynamic wet bulb temperature?	**[2M]**
h	With the help of psychrometric chart explain the following process and give the important characteristic features of adiabatic cooling and humidification process	**[3M]**
i	Give the classification of fans.	**[2M]**
j	Explain selection of the fan using fan characteristic curve	**[3M]**

PART-B (50 MARKS)
SECTION-I

2 Explain Boot strap evaporative cooling air refrigeration system. Draw its schematic and represent the processes on T-S diagram. Write down the equations for calculating mass flow rate, power and COP of the system   **[10M]**

OR

3 Explain the difference between simple air craft refrigeration and boot-strap air refrigeration system   **[10M]**

SECTION-II

4 How does an actual vapour compression cycle differ from that of a theoretical cycle?   **[10M]**

OR

5 Discuss the effect of sub-cooling on COP. Would you desire large sub-cooling and why?   **[10M]**

SECTION-III

6   Draw a neat diagram of three-fluid system of refrigeration (Electrolux **[10M]** refrigeration system) and explain its working

OR

7   Derive an expression for finding out the mass of motive steam required per kg of **[10M]** water vapour produced.

SECTION-IV

8   Explain the difference between comfort air-conditioning and industrial air- **[10M]** conditioning

OR

9   Define room sensible heat factor. How room sensible heat factor line is drawn on **[10M]** the psychrometric chart?

SECTION-V

10   Explain in detail about heat pump circuits? **[10M]**

OR

11   Explain the various types of axial flow fans. **[10M]**

******

Code No: **R15A0327**
R15
MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2022
Composite Materials
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question From each SECTION and each Question carries 10 marks.

***
PART-A (25 Marks)

1). a   What are advanced composites?   **[2M]**
  b   List the various functions that a matrix phase performs in a composite material   **[3M]**
  c   What are the functions and desirable properties of resins?   **[2M]**
  d   What are the types of glass fibers?   **[3M]**
  e   What is reinforced composite?   **[2M]**
  f   What is the role of a coupling agent present in the interface between reinforcement   **[3M]**
      and matrix
  g   What are the types of laminates given below? Mention which elements of 21[A],   **[2M]**
      [B] and [D] are zero for each of them. (1) [± 45 / ± 45]   (2) [30 / -45 / -30 / 45]
      (3) [0 / 90 / 0 / 90]
  h   What are fiber metal laminates?   **[3M]**
  i   Define adhesive bonding?   **[2M]**
  j   Explain about joining method. Write down any two disadvantages of joining   **[3M]**
      method?
PART-B (50 MARKS)
SECTION-I
2   i)Define composites, classify them accordance with the materials and   **[5M]**
    reinforcement types.
    ii)Explain the role of matrix and fibers in laminated composites.   **[5M]**
                                        OR
3   What are advanced composites? List and briefly explain the limitations of   **[10M]**
    composite materials
SECTION-II
4   i) With the help of neat sketches explain 'Pultrusion' and 'Pulforming'   **[5M]**
    ii) With a neat sketch explain filament winding process.   **[5M]**
                                        OR
5   i)Explain with neat sketches the production of carbon fibers.   **[5M]**
    ii)What are the functions and desirable properties of resigns?   **[5M]**

SECTION-III

6 i)What are volume and mass fractions? Explain briefly **[5M]**

   ii) Derive the equation for transverse and shear modulus for composites. **[5M]**

OR

7 i)Calculate the modulus of elasticity of a composite material consisting of 60% by volume of continuous E-glass fiber and 40% epoxy resin for the matrix when stressed under isostress conditions. (i.e the material is stresses perpendicular to the continuous fiber). The modulus of elasticity of the E glass is 72.4 GPa and that of the epoxy resin is 3.1 GPa **[5M]**

   ii)What happens when a Composite is stressed? Explain with a neat sketch? **[5M]**

SECTION-IV

8 Briefly discuss symmetric laminates, angle ply laminates and express their force and moment resultants relations with mid plane strains and curvatures. **[10M]**

OR

9 Calculate the A and B matrix for a three layered [90/0/90] laminate if E_1=125GPa, E_2=10GPa,E_6=6GPa,V_{12}=0.30 and total thickness of laminate is 1.5mm **[10M]**

SECTION-V

10 Explain the advantages and disadvantages of adhesive and mechanical fastened joints? **[10M]**

OR

11 Discuss about test producer in failure theory **[10M]**

******

MALLA REDDY COLLEGE OF ENGINEERING & TECH **R15** GY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2022
Finite Element Method
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question From each SECTION and each Question carries 10 marks.
***

PART-A (25 Marks)

1). a	Explain the concept of potential energy?	**[2M]**
b	Write the relation between stresses and equilibrium, strain-displacement and stressstrain?	**[3M]**
c	Explain the discretization procedures?	**[2M]**
d	Derive the shape functions for a 2D truss element?	**[3M]**
e	Write down the stiffness matrix equation for four noded iso-parametric quadrilateral elements.	**[2M]**
f	What are the conditions for the problem to be Axisymmetric?	**[3M]**
g	Derive the shape function for 2-D heat transfer element?	**[2M]**
h	Explain 'Galerkin Approach' in beams?	**[3M]**
i	What is dynamic analysis?	**[2M]**
j	How do you understand the Eigen values in vibration problem?	**[3M]**

PART-B (50 MARKS)
SECTION-I

2	Derive the strain displacement relation for a 2 dimensional element?	**[10M]**

OR

3	Derive the expression to calculate the maximum deflection in a beam of length L with a point load P acting at the center by using Rayleigh Ritz method. Take moment of inertia as I and young's modulus as E.	**[10M]**

SECTION-II

4	Explain different approaches of getting the finite element equations and Explain the natural and geometric boundary conditions.	**[10M]**

OR

5	Define shape function? Derive shape function in terms of Cartesian coordinates?	**[10M]**

SECTION-III

6	Derive the strain displacement matrix of a constant strain triangle element.	**[10M]**

OR

7	From the first principles, derive the shape functions for 2-D quadrilateral element.	**[10M]**

SECTION-IV

8 Derive the strain displacement relationship matrix for CST element. **[10M]**

OR

9 Find the displacement and stresses in long thin-walled cylinder of under an **[10M]**
internal pressure of 50bar. The inside and outside diameters are 20cm and 50cm.
Assume E=200GPa and poission's ratio as 0.4

SECTION-V

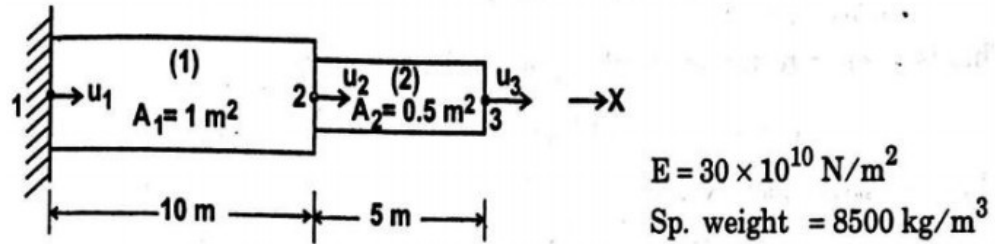10 Determine the Eigen values and frequencies for the stepped bar as shown in **[10M]**
figure (1)

Figure (1)

OR

11 A wall of 1m thickness has thermal conductivity of 1.2 W/mk. The wall is to be **[10M]**
insulated with a material of thickness 0.06 m having an average thermal
conductivity of 0.3 W/mk. The inner surface temperature is 1000^0C and outside of
the insulation is exposed to atmospheric air at 27^0C with heat transfer coefficient
of 30 W/m^{2}K. Calculate the nodal temperatures.

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Code No: **R15A0323**

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2022
Heat Transfer
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question From each SECTION and each Question carries 10 marks.
***
Note: Heat Transfer Data books are permitted
PART-A (25 Marks)

1). a Define the following: i) Radiation heat transfer Coefficient ii) overall heat transfer   **[2M]**
   coefficient
   b What is the difference between thermodynamics and heat transfer?   **[3M]**
   c Differentiate free and forced convection?   **[2M]**
   d Explain about Laminar heat transfer correlation   **[3M]**
   e Define Lambert's law of radiation.   **[2M]**
   f Explain the parameters in Stefan Boltzman equation   **[3M]**
   g What is burnout point?   **[2M]**
   h Explain briefly the condensation mechanism.   **[3M]**
   i List out the modes of mass transfer   **[2M]**
   j Explain "Fick's law of diffusion" briefly   **[3M]**

PART-B (50 MARKS)
SECTION-I

2 Define thermal conductivity and explain the various factors on which it depends.   **[10M]**

OR

3 A 250 mm outer diameter steam pipe maintained at temperature 150^0 C is exposed   **[10M]**
   to an ambient at 25^0 C with a convection heat transfer coefficient of 50 W/m^{2}K.
   Calculate the thickness of the asbestos insulation (of thermal conductivity 0.1
   W/m K) required to reduce the heat loss from the pipe by 50%.

SECTION-II

4 Discuss the physical significance of dimensionless numbers Re, Nu, Pr, st, Gr   **[10M]**

OR

5 Describe the Rayleigh's method for dimensional analysis.   **[10M]**

SECTION-III

6 State and explain the 'Total radiation: Stefan-Boltzmann law', relating to thermal   **[10M]**
   radiation and temperature of a radiating body.

OR

7 Determine the heat transfer rate by free convection from a 0.3m x 0.3m plate   **[10M]**

whose one surface is insulated and other surface is maintained at 100^0 C and exposed to atmosphere at 30^0 C when i) The plate is vertical. ii) The plate is horizontal with the heated surface facing down.

SECTION-IV

8 A heat exchanger is required to cool 55,000 kg/hr of alcohol from 66^0C to 40^0C using 40,000 kg/hr of water entering at 5^0C. Calculate the surface area required for i) Parallel flow mode ii) Counter flow mode. Take U (over all heat transfer coefficient) = 580 W/m^2 k, Cp for alcohol = 3760J/kg.K, Cp for water = 4180 J/kg.K **[10M]**

OR

9 Derive an expression for logarithmic mean temperature difference (LMTD) in case of counter flow heat exchanger. **[10M]**

SECTION-V

10 The roof of a house is 15 m X 8 m and is made of a 20-cm-thick concrete layer. The interior of the house is maintained at 25°C and 50 % relative humidity and the local atmospheric pressure is 100 kPa. Determine the amount of water vapor that will migrate through the roof in 24 h if the averages outside conditions during that period are 3°C and 30 % relative humidity. The permeability of concrete to water vapor is 24.7 X 10^{-12} kg/s · m · Pa **[10M]**

OR

11 A long nickel bar with a diameter of 5 cm has been stored in a hydrogen-rich environment at 358 K and 300 kPa for a long time, and thus it contains hydrogen gas throughout uniformly. Now the bar is taken into a well-ventilated area so that the hydrogen concentration at the outer surface remains at almost zero at all times. Determine how long it will take for the hydrogen concentration at the center of the bar to drop by half. The diffusion coefficient of hydrogen in the nickel bar at the room temperature of 298 K can be taken to be D_{AB} = 1.2 X 10^{-12} m^2 /s **[10M]**

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2022
Machine Design - II
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question From each SECTION and each Question carries 10 marks.
******

PART-A(25 Marks)

1. a. Name the material that is used for make a ball bearing?   **[2M]**
    b. What is meant by conformability and embed ability with respect to sliding contact bearing?
                                                                                       [3M]
    c. A piston is made up of grey cast iron has piston head thickness of 20 mm. What will be thickness of piston barrel under piston rings if it has allowable tensile stress of 30 Mpa if bore diameter is 50 mm and P_{max} is 15 Mpa?   **[2M]**
    d. Why are the connecting rods made of I-section?   **[3M]**
    e. What is the centrifugal effect on belts?   **[2M]**
    f. What are the desirable properties of the belt materials?   **[3M**]
    g. What is herringbone gear? Where are they used?   **[2M]**
    h. What are the causes of failure of gear tooth?   **[3M]**
    i. Why are square threads preferable over V threads for the power transmission?   **[2M]**
    j. What are the applications of square threads?   **[3M]**

PART-B

SECTION-I

2. A journal bearing of 75mm long and 150 mm diameter has diametral clearance of 0.25mm. Journal rotates at 3000rpm. Compare the power loss and friction torque for SAE10, SAE20 and SAE60 grade oils. Make suitable assumptions. 5kN l load is acting on the bearing. **[10M]**
                                    OR

3 a. Give the relative advantages and disadvantages of ball and roller bearings as compared to journal bearings.
b. Determine the type and size of ball bearing for a 75mm shaft. The shaft speed is 325rpm, the radial load is 9kN, with very light shocks and the axial load is 3.5kN. The installation is temporary one, to serve not over 1year with 8hr service per day. The bearing is to be placed 0.9m from one end of the shaft. **[2M+8M]**

SECTION-II

4. a. Why piston clearance is necessary? What is its usual value?

  b. Design the piston for a single acting 4stroke engine for the given data Cylinder   bore=   125mm, Stroke = 150mm, Maximum gas pressure = 5Mpa. Indicated mean effective pressure 0.75Mpa, mechanical efficiency 82%, fuel consumption is 15 Kg kW of brake power per hour, HCV of fuel = 42.5 x 10^{-3}Kj/Kg and speed 1800rpm. **[2M+8M]**

OR

5. Determine the dimensions of connecting rod for a diesel engine with the following data:
   Cylinder bore= 100mm,
   maximum gas pressure= 2.45MPa,
   (l/d)ratio for piston pin bearing= 1.5
   (l/d)ratio for crank pin bearing= 1.4
   Allowable bearing pressure for piston pin bearing= 15MPa
   Allowable bearing pressure for crank pin bearing= 10MPa   **[10M]**

SECTION-III

6. a. What are advantages of wire rope drive over belt drive.

  b. Select a suitable wire rope for a wire hoist carrying a load of 80 kN to be lifted from a depth of 100m. The speed of 10m/s should be attained in 10seconds. **[2M+8M]**

OR

7. It is required to select a flat-belt drive to connect two transmission shafts rotating at 800 and 400 rpm respectively. The centre to centre distance between the shafts is approximately 3m and the belt drive is open-type. The power transmitted by the belt is 30kW and the load correction factor is 1.3. The belt should operate at a velocity between 17.8 to 22.9m/s. The power transmitting capacity of the belt per mm width per ply at 180^0 arc of contact and at a belt velocity of 5.08m/s is 0.0147 Kw. Select preferred pulley diameters and specify the belt.   **[10M]**

SECTION-IV

8. a. what is interference in involute gear?

  b. A pair of spur gears must transmit 36 kWfrom a shaft running at 300rpm to another shaft with speed reduction of 3:5:1. The center distance of the shafts is 400mm. Determine:
   i. Module and number of teeth on gears
   ii. Dynamic and wear load. **[2M+8M]**

OR

9. A pair of helical gears is to be transmit the power of 30 kW at a pinion speed of 1500 rpm. The velocity ratio is 2.5. Selecting suitable material , determine the dimensions of the gears? **[10M]**

SECTION-V

10. a. what is a power screw? List applications of power screw.
    b.The power screw has 6mm pitch and 40mm diameter. The screw is subjected to an axial load of 6 kN. The length of nut is 12mm. Determine
           i.   The bearing pressure between the threads.
          ii.   The shear stress on threads.
         iii.   Compressive stress in the screw. **[2M+8M]**

OR

11. Design a lead screw and split nut for a lathe for the following specifications
       a) Maximum axial load =10kN
       b) Operating speed of nut movement=0.3 m/min
       c) Stroke required =1250 mm
Also calculate the efficiency and the power required to drive the screw?   **[10M]**

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Code No: **R15A0328**

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH~~NOLO~~GY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, February 2022
Production and Operations Management
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question From each SECTION and each Question carries 10 marks.
***
PART-A (25 Marks)

1). a	Define job shop	[2M]
b	Differentiate between product life cycle and process life cycle	[3M]
c	List out different types of layouts	[2M]
d	Write about reliability	[3M]
e	Write about OC curves in quality control	[2M]
f	Write standards and specifications in quality control	[3M]
g	Define concept of waste management	[2M]
h	Explain importance of materials management	[3M]
i	List out the types of inventory	[2M]
j	Write about safety stock inventory control	[3M]

PART-B (50 MARKS)

SECTION-I

2   Discuss the application of Gantt task model in the production planning. how does **[10M]**
    differ in Batch production and job order production

OR

3   Explain in detail about role of Operatin Management in Total management **[10M]**
    system.

SECTION-II

4   Explain the principle of plant layout and write its objectives **[10M]**

OR

5   What is plant location? Discuss the steps taken in choosing a plant location **[10M]**

SECTION-III

6   Write short note on:
    i)Quality circles **[5M]**
    ii)Total quality management **[5M]**

OR

7   i)Explain any four benefits of work measurements **[5M]**
    ii)Discuss the effectiveness of acceptance sampling in quality control **[5M]**

SECTION-IV

8   Give the meaning of materials handling. Explain the principles of material handling system   **[10M]**

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

9   i)Outline the criteria for the selection of suppliers   **[5M]**

     ii)Explain the types of waste   **[5M]**

SECTION-V

10   What are the objectives of stores management? explain requirements for efficient managements of stores   **[10M]**

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

11   How does value analysis enable cost reduction? Discuss the procedure for cost reduction   **[10M]**

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

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, June 2022
Refrigeration and Air Conditioning
(ME)

Roll No									

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

Answer Any **Five** Questions
All Questions carries equal marks.
***
Note: Refrigeration Tables and psychometric charts are permitted

1   Explain working principle of Bell-coleman cycle with net sketch and draw P-V and T-S diagrams   **[15M]**

2   The atmospheric air at pressure 1 bar and temperature -5^{0}C is drawn in thecylinder of the compressor of a bell-coleman refrigerating machine. It is compressed is entropically to a pressure of 5bar.In the cooler, the compressed air is cooled to 15^{0}C , pressure remaining the same .It is then expanded to a pressure of 1bar in an expansion cylinder ,from where it is passed to the cold chamber .Find: i) the work done per kg of air, ii)C.O.P of the plant.For air assume low for expansion, PV$^{1.2}$=constant; law for compression, PV$^{1.4}$=constant and specific heat of air at constant pressure=1kJ/kg K   **[15M]**

3   Explain with neat sketch mechanism of a simple vapour compression refrigeration system   **[15M]**

4   Explain the following processes:
i)cycle with super heated vapour after compression   **[7M]**
ii)cycle with super heated vapour before compression   **[8M]**

5   Explain, With the help of a neat sketch, the working of a stem jet refrigeration system   **[15M]**

6   a) In vapour absorption system, heat is supplied to the generator at a temperature of 90^{0}C. The cooling in condenser and refrigeration evaporator takes place at 20^{0}C and -10^{0}C respectively. Find the maximum COP of the system.   **[7M]**

b) In an absorption type refrigerator, the heat is supplied to NH$_3$ generator by condensing steam at 2 bar and 90% dry. The temperature in the refrigerator is to be maintained at -5^{0}C. Find the maximum COP possible. If the refrigeration load is 20 tonnes and actual COP is 70% of the maximum COP. Find the mass of steam required per hour. Take temperature of the atmosphere as 30^{0}C   **[8M]**

7   a)Explain about effective room sensible heat factor   **[7M]**
b)A room has a sensible heat gain of 24kW and a latent heat gain of 5.2kW and it has to be maintained at 26^{0}C DBT and 50%RH. 180m^3/min of air is delivered to the room. Determine the state of supply air.   **[8M]**

8   List the type of blower and explain any one of the blower with neat sketch   **[15M]**
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Code No: R15A0327

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, June 2022
Composite Materials
(ME)

Roll No										

Time: 3 hours   Max. Marks: 75

Answer Any **Five** Questions
All Questions carries equal marks.
***

1   a)What are the advantages and limitations of composite materials over alloys?   **[7M]**
    b)List out the applications of composite materials.   **[8M]**

2   a)Explain how reinforcements effect the properties of composite materials   **[7M]**
    b)Describe the future potential of composite materials   **[8M]**

3   With the help of sketch/flow chart explain the stages involved in hand lay-up   **[15M]**
    method for the production of polymer based composites

4   With illustration and giving all the details explain filament winding process used **[15M]**
    to manufacture polymer matrix composites

5   Derive the expression to determine the following properties of unidirectional
    composites
        i)   shear modulus   **[7M]**
        ii)   poisson's ratio   **[8M]**

6   In composite materials, explain how the following parameters affect the stiffness
    and strength.
    i)Aligned systems   **[7M]**
    ii)variable Fibre orientation   **[8M]**

7   Explain Various features for the following laminates
    i)cross ply laminates   **[5M]**
    ii)Angle-ply laminates   **[5M]**
    iii)symmetric laminates   **[5M]**

8   Discuss the following failure theories which are applicable for fiber reinforced
    polymer composites
    i)Maximum strain theory   **[7M]**
    ii)Tsai-Hill theory   **[8M]**

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Code No: **R15A0322**

MALLA REDDY COLLEGE OF ENGINEERING & TECH **R15** GY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, June 2022
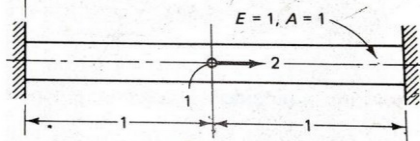
Finite Element Method

(ME)

| Roll No										

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

Answer Any **Five** Questions

All Questions carries equal marks.

***

1. A rod fixed at its end is subjected to a varying body force as shown in below **[15M]** figure. Use the Rayleigh-ritz method with an assumed displacement field $u=a_0+a_1x+a_2x^2$ to determine displacement u(x) and stress σ(x)

2   Derive the stress strain equations for 3-D body in equilibrium.   **[15M]**

3   For the configuration shown in figure below determine the deflection at the point **[15M]** of load application using a one-element model. If a mesh of several triangular elements is used, comment on the stress values in the elements close to the tip
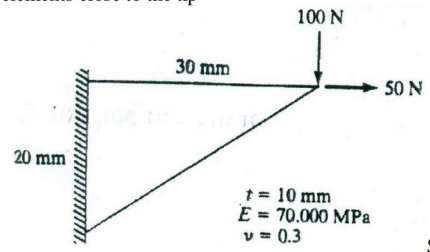
4   Compute the stresses developed in the members of the truss shown in below figure **[15M]**
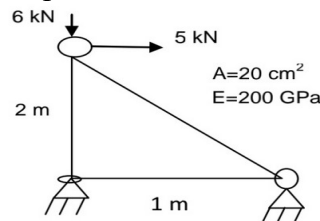
5   Explain in detail the applications of iso-parametric elements in two and three **[15M]** dimensional stress analysis.

6   The nodal displacements of a rectangular element having nodal coordinates (0,0), **[15M]** (4,0),(4,2) and (0,2) are : u_1=0mm, u_2=0.1, v_2=0.05mm,u_3=0.05mm, v_3=0.50mm,u_4=0.0mm and v_4=0.0mm respectively. Determine the stress matrix at r=0 and s=0 using the isoparametric formulation. Take E=210Gpa and poission's

ratio=0.25.

7   A long bar of rectangular cross section, having thermal conductivity of 3W/m⁰C,   **[15M]**
is subjected to the boundary conditions shown in below figure. Two opposite sides
are maintained at a uniform temperature of 150^0C; one side is insulated , and the
remaining side is subjected to a convection process with $T_a=20^0C$ and $h=25W/m^2$
^0C.Dtermine the temperature distribution in the bar

T=150 °C   Insulated Edge

h=25 W/m² °C
$T_\infty=20°C$

k=3 W/m °C   1.2 m

0.9 m

T=150 °C
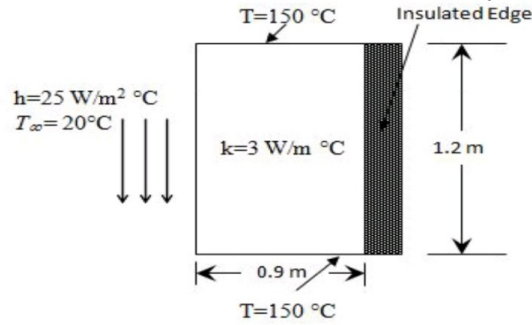
8   Determine the eigenvalues and eigenvectors for the stepped bar as show in figure   **[15M]**
below
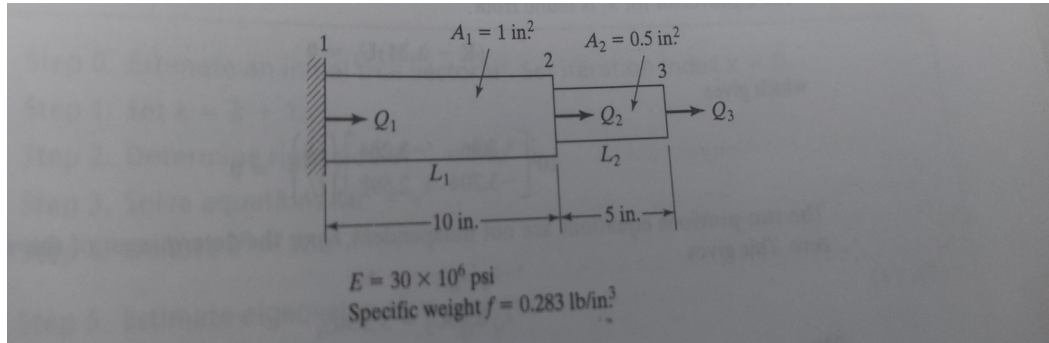
$A_1 = 1$ in² $A_2 = 0.5$ in²

1   2   3

Q_1 Q_2 Q_3

L_1 L_2

10 in.   5 in.

$E = 30 \times 10^6$ psi
Specific weight $f = 0.283$ lb/in³

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH⬜⬜GY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, June 2022
Heat Transfer
(ME)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.
***
Note: Heat and Mass Transfer data books are permitted

1 a) Derive general heat conduction equation in Cartesian co-ordinates. **[7M]**
   b)An insulated pipe of 50mm outside diameter(k=0.8W/m-K) is laid in a room at 30^0C. If the surface temperatures is 250^0C and the convective heat transfer coefficient is 10W/m^2K. Calculate the heat loss per unit length of pipe. **[8M]**

2 a)A steel ball 50mm in diameter and at 900^0C is placed in still atmosphere of **[7M]**
   30^0C. Calculate the initial rate of cooling of the ball in ^{0}C/min. Take **[8M]**
   ρ=7800kg/m^3 , C=2kj/kg^{0}C(for steel); h=30W/m^{20}C
   b)what are Heisler charts? And explain the significance of Heisler charts in solving transient conduction problems

3 A plate of length 500mm and width 250mm has been placed longitudinally in a **[15M]**
   stream of crude oil which flows with a velocity of 6m/s. If the oil has a specific gravity of 0.9 and kinematic viscosity of 1 stoke, calculate:
   i)boundary layer thickness at the middle of plate
   ii)shear stress at the middle of plate and
   iii) Friction drag on one side of the plate.

4 A hot plate 1.1m wide, 300mm high and at 120^0C is exposed to the ambient still **[15M]**
   air at 20^0C. Calculate: i)maximum velocity boundary layer thickness and local heat transfer coefficient at 150mm from the leading edge of the plate, ii)total mass flow through the boundary ; iii) heat loss from the plate and iv) Rise in temperatures of the air passing through the boundary.

5 a) Derive expression for the radiation heat exchange between two black **[7M]**
      surfaces
   b) Derive expression for the radiation heat exchange for three gray surfaces. **[8M]**

6 a)A 60mm thick plate with a circular hole of 30mm diameter along the thickness **[7M]**
   is maintained at uniform temperature of 277^0C. Find the loss of energy to the surrounding at 20^0C, assuming that the two ends of the hole to be as parallel disc

and the metallic surfaces and surroundings have black body characteristics.

b)Assuming the sun to radiate as a black body, calculate its temperature from the data given below:

solar constant=1400W/m^2; Radius of the sun=6.97×10^{8}m; Distance between the sun and the earth=14.96×10^{10}m. **[8M]**

7 The outer surface of a cylinder drum 350mm diameter is exposed to saturated steam at 2.0 bar for condensation. If the surface temperature of the drum is maintained at 80^0 C, calculate the following: **[7M]**

   i)   The length of the drum;

   ii)   The thickness of the condensate layer to condense 70kg/h of steam. **[8M]**

   b) Enumerate the applications of boiling heat transfer.

8 a)A 20mm deep pan is filled with water to a level of 10mm and is exposed to dry air at 40^{0}C.Dtermine the time required for all the water to evaporate. Assume the mass diffusivity as 2.6×10^{-5}m^2/s. **[7M]**

   b) Calculate the rate of diffusion of water vapour from a pool of water at the bottom of a well which is 6m deep and 2.5m diameter to dry ambient air over the top of the well. The entire system may be assumed at 30^{0}C and one atmospheric pressure. The diffusion coefficient is 2.5×10^{-5}m^2/s. **[8M]**

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, June 2022
Machine Design - II
(ME)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.
***

1	a)	What are rolling contact bearings? Discuss their advantages over sliding contact bearings	**[7M]**
	b)	Write short note on classifications and different types of antifriction bearings	**[8M]**
2	a)	How do you express the life of a bearing? What is an average or median life	**[5M]**
	b)	A single deep groove ball bearing operating at 200 r.p.m. is acted by a 10kN radial load and 8kN thrust load. The bearing is subjected to a light shock load and the outer ring is rotating. Determine the rating life of the bearing.	**[10M]**

3   A four stroke diesel engine has the following specifications: **[15M]**
Brake power=5kW; Speed=1200r.p.m; Indicated mean effective pressure=0.35N/mm^2; Mechanical Efficiency=80%. Determine : i)Bore and length of the cylinder; ii)thickness of the cylinder head iii) size of studs for the cylinder head

4   Design a cast iron piston for a single acting four stroke engine for the following   **[15M]**
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=42*10^{3}kJ/kg; Speed=200r.p.m; Any other data required for the design may be assumed.

5   a) A leather belt 9mm×250mm is used to drive a cast iron pulley 900mm in   **[7M]**
diameter at 336 r.p.m if the active arc on the smaller pulley is 120^0 and the stress in tight side is 2MPa. Find the power capacity of the belt. The density of the leather may be taken as 980kg/m^3, and the coefficient of friction of leather on cast iron is 0.35
b)list and discuss the factors that control the power transmission capacity of a belt   **[8M]**

6   Design a belt drive to transmit 110kW for a system consisting of two pulleys of   **[15M]**
diameters 0.9m and 1.2m, centre distance of 3.6m, a belt speed 20m/s, coefficient of friction 0.3, a slip of 1.2% at each pulley and 5%friction loss at each shaft,20% over load.

7   A pair of straight teeth spur gears is to transmit 20kw when the pinion rotates at   **[15M]**

300 r.p.m. the velocity ratio is 1:3. The allowable static stresses for the pinion and gear materials are 120MPa and 100MPa respectively. The pinion has 15 teeth and its face width is 14 times the module. Determine :i) module ; ii) face width ; iii) pitch circle diameters of both the pinion and the gear from the stand point of strength only, taking in to consideration the effect of the dynamic load. The tooth form factor 'y' can be taken as y=0.154-0.912/No.of teeth. C_v=3/3+v. Where v is expressed in m/s.

8   Discuss the various types of power threads. Give at least two practical applications   **[15M]**
     for each type. Discuss their relative advantages and disadvantages
                                        ******

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, June 2022
Production and Operations Management
(ME)

Roll No										

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

Answer Any **Five** Questions
All Questions carries equal marks.
***

1   What is production management? What is operations management? Bring out the   **[15M]**
    difference between two?

2   Discuss the role of Operation Management and its function.   **[15M]**

3   Explain about Master Production Schedule (MPS) and Operation schedule and its   **[15M]**
    Objectives?

4   Define plant layout. Explain different types of plant layout with advantages and   **[15M]**
    limitations in detail?

5   a)Explain briefly about statistical quality control   **[7M]**
    b)explain about centralized inspection and write its advantages   **[8M]**

6   Briefly explain about statistical control charts.   **[15M]**

7   Explain briefly about material requirement planning (MRP)?   **[15M]**

8   Explain ABC analysis process with example and write its advantages and   **[15M]**
    limitations

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester supplementary Examinations, Nov/Dec 2018
Refrigeration and Air Conditioning
(ME)

Roll No										

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

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

PART – A   **(25 Marks)**

1. (a) What is the need of refrigeration in Aircrafts?   [2M]
    (b) Briefly classify refrigerants   [3M]
    (c) Discuss the effect of super heating on COP   [2M]
    (d) Discuss the operation of capillary tube in a refrigeration system [3M]
    (e) State the function of rectifier in vapour absorption system   [2M]
    (f) Explain the working principle of practical ammonia refrigeration [3M]
    (g) DefineRelative humidity   [2M]
    (h) Define room sensible heat factor   [3M]
    (i) What do you mean by dehumidification   [2M]
    (j) list out the various factors effecting Comfort Air conditioning [3M]

PART –B   **(50 Marks)**
SECTION – I

2. A). Explain Boot strap evaporative cooling air refrigeration system. Draw its schematic and represent the processes on T-S diagram. Write down the equations for calculating mass flow rate, power and COP of the system.   [6M]

B). Explain any one type of expansion valve with line diagram [4M]

(OR)

3. A). Explain refrigeration system using Brayton cycle and show the state points on Temperature-Entropy diagram considering the irreversibility [4M]

B). A Refrigerator working on Bell-Coleman cycle takes air into the compressor at 1 barand – 5^{0}C. It is compressed in compressor to a 5 bar and cooled to 25^{0}C at the same pressure. It is further expanded in the expander to 1 bar and discharged to takecooling load. The isentropic efficiency of the compressor = 85% and the isentropicefficiency of the Expander = 90% find the following:

  i) Refrigerating capacity of the system if air circulation is 40kg/min.
  ii) KW capacity of motor required to run the compressor
  iii) COP of the system.
      Take γ =1.4 Cp=1kJ/kg Cv= 0.7 kJ/kg for air [6M]

SECTION – II

4. Draw the vapour compression refrigeration cycle on T-s diagram when the refrigerant is dry and saturated at the end of compression and find an expression for the C.O.P in terms of (i) Temperature and entropies; (ii)Enthalpy.[10M]

(OR)

5. A refrigerating plant of 28 kW capacity has its evaporation temperature -8^0C and condenser temperature of 30^0C. The refrigerant, R-12 is sub-cooled 5^0C before entering the expansion valve and the vapour is superheated 6^0C before leaving the evaporator coil. The compression of the refrigerant in the compressor is isentropic. If there is a suction pressure drop of 0.2 bar through the valves; and discharge pressure drop through the valve of 0.1 bar, determine the C.O.P. of the plant, theoretical piston displacements/min and the heat removed in the condenser. Solve the problem with the help of P-h chart. Give also a diagrammatic sketch of this cycle on the T-s chart. [10M]

SECTION – III

6. Draw a neat diagram of lithium bromide water absorption system and explain its working in major field of applications of this system. [10M]

(OR)

7. A). Explain Steam jet refrigeration system with neat system diagram and T-S or P-Hdiagram. [6M]

b) What are desirable characteristics of absorbent [4M]

SECTION – IV

8. A). Following data is available for an air conditioning system comprising of filter, cooling coil, fan and distribution system using only fresh air for the purpose of maintainingcomfort conditions in summer. RSH = 11.63 KW, RLH = 2.33 KW. Outside designcondition: 28°C DBT, 20°C WBT. Inside design condition: 21°C DBT, 50% RH.Temperature of air entering the room = 11°C. Calculate

i) RSHF
ii) Coil bypass factor
iii) Rate of flow of air kg/hr.
iv) Load on cooling coil
v) Coil ADP [10M]

(OR)

9. Define the following [4M]
   A. Dry bulb temperature
   B. Dew point temperature

b) Define the "Human comfort" and explain the factors which affect human comfort. [6M]

.SECTION – V

10. Explain the working of various types of axial flow fans with neat diagram.[10M]

(OR)

11. A. What are the Requirements of Industrial air conditioning explain in detail [7M]

B. Explain the need of comfort charts [3M]

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester supplementary Examinations, Nov/Dec 2018
Composite Materials
(ME)

Roll No									

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question   from each SECTION and each Question carries 10 marks.
***** *

PART – A   (25 Marks)
1. (a) Define a composite material and how it is different from an alloy. [2M]
   (b) What is the difference between lamina and laminate? [3M]
   (c) Discuss about Polymer Matrix composites. [2M]
   (d) Explain types of joints in adhesive bonded mechanisms. [3M]
   (e) Differentiate between longitudinal and transverse direction in a composite material. [2M]
   (f) Explain failure of longitudinal tensile load in a composite material. [3M]
   (g) Classify composite materials depending on the geometry of reinforcing phase? [2M]
   (h) Define volume fraction in composite materials. [3M]
   (i) How does the bond form in adhesive bonding? [2M]
   (j) Mention few joining methods in composite materials. [3M]

PART – B   (50 Marks)
SECTION – I

2. Classify the composite materials stating advantages and dis-advantages.   [10M]
(OR)
3. Explain with the neat sketch the manufacturing of glass fibers.   [10M]

SECTION – II
4. With the neat sketch explain the filament winding process and state where this is adopted.[10M]
(OR)
5. With neat sketch explain Resin transfer moulding. [10M]

SECTION – III
6. Derive an expression for elastic modulus of a UD lamina in terms of weight fraction and volume fraction. [10M]

(OR)
7. If fibers are arranged in hexagonal fashion with one fiber at the center, calculate the maximum fiber volume fraction that can be accommodated. State the assumptions made in the micromechanical analysis. [10M]

SECTION – IV
8. State the assumptions made in CLT. Derive the constitutive equation for a laminate.[10M]
(OR)
9. Explain about types of laminates in detail.   [10M]

SECTION – V
10. Discuss the method of evaluating bond strength with neat sketch. [10M]
(OR)
11. What are the various types of joints discuss them in detail. [10M]

***** *

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester supplementary Examinations, Nov/Dec 2018
Finite Element Methods
(ME)

Roll No										

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions,
Choosing ONE Question   from each SECTION and each Question carries 10 marks.

PART – A

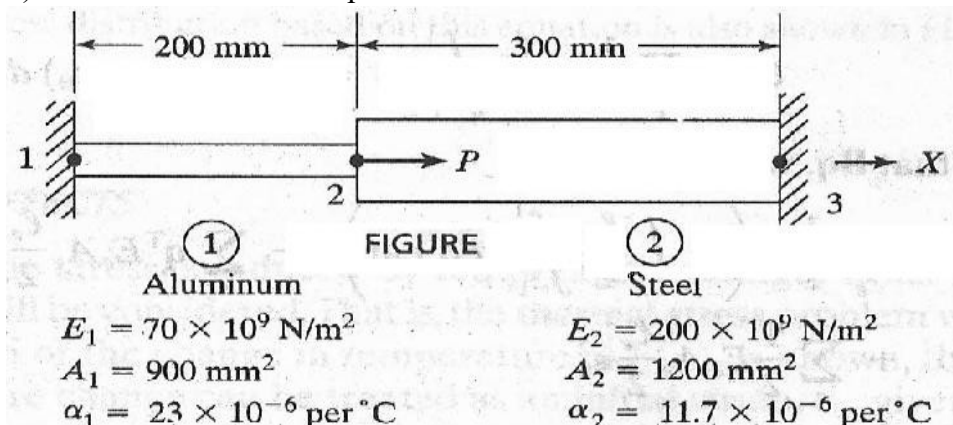|		
1.a.	Briefly discuss weighted residual method for giving approximate solutions for complicated domains	[2M]
b.	Write the stiffness matrix for 1-d element with linear interpolation functions	[3M]
c.	Differentiate iso-parametric, sub-parametric, and super parametric elements?	[2M]
d.	What is the difference between plane truss and space truss?	[3M]
e.	What are the uses of natural coordinates in 2d- Quadrilateral elements	[2M]
f.	What are the suitable applications of axi-symmetric elements in FEM?	[3M]
g.	Write the governing equation for FEA formulation for a fin	[2M]
h	Express the stiffness matrix for a 1-D conduction problem	[3M]
i.	What do you understand by mode shapes?	[2M]
j.	How principle of minimum potential energy is useful in dynamic analysis of systems	[3M]

PART – B   10 * 5 = 50 Marks

SECTION-I

2.	Derive the equations equilibriums for 3-D body	[10M]

OR

|		

3.	An axial load $P=300 \times 10^3 N$ is applied at 200 C to the rod as shown in Figure below. The temperature is the raised to 600 C .
	  a) Assemble the K and F matrices.
	  b) Determine the nodal displacements and stresses.
		[10M]

FIGURE

Aluminum
$E_1 = 70 \times 10^9 \text{ N/m}^2$
$A_1 = 900 \text{ mm}^2$
$\alpha_1 = 23 \times 10^{-6} \text{ per }^\circ C$

Steel
$E_2 = 200 \times 10^9 \text{ N/m}^2$
$A_2 = 1200 \text{ mm}^2$
$\alpha_2 = 11.7 \times 10^{-6} \text{ per }^\circ C$

4. a) Write the difference between CST and LST elements [3M]
    b) For point P located inside the triangle shown in the figure below the shape functions
    N1 and N2 are 0.15 and 0.25, respectively. Determine the x and y coordinates of point [7M]
    P.
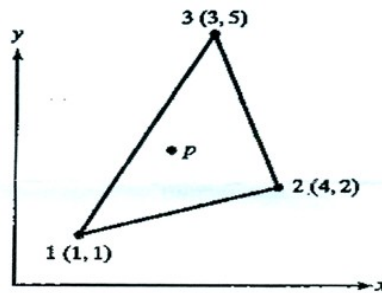
OR

5   For the configuration shown in Fig. determine the deflection at the point of load application [10M]
    using a one-element model. If a mesh of several triangular elements is used, comment on the
    stress values in the elements close to the tip
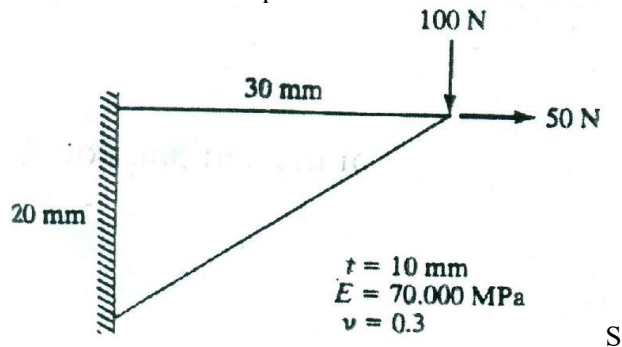
6. Derive the strain displacement matrix for axisymmetric triangular element Discuss [10M]
    advantages of axisymmetric modelling in FEM

OR

7. Figure shows a five – member steel frame subjected to loads at the free end. The cross section [10M]
    of each member is a tube of wall thickness t=1 cm and mean radius=6cm. Determine the
    following:
    a) The displacement of node 3 and
   b) The maximum axial compressive stress in a member
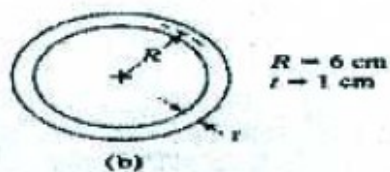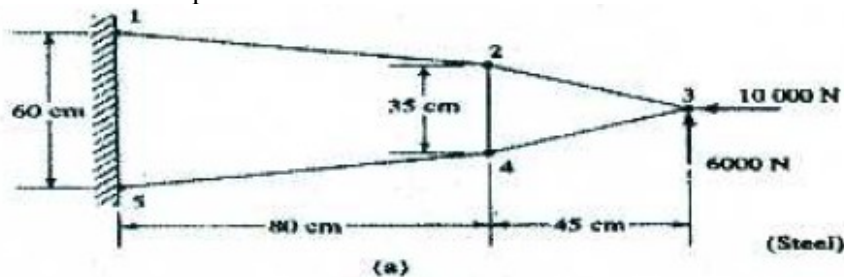
8. Find the temperature distribution in the one-dimensional fin shown in Figure below [10M]
    using two finite elements.

$T_\infty = 40°C$ $h = 5 \dfrac{\text{watts}}{\text{cm}^2\text{-}°K}$

140°C

1 cm radius

End surface A

$L = 5$ cm

$k = 70 \dfrac{\text{watts}}{\text{cm -}°K}$
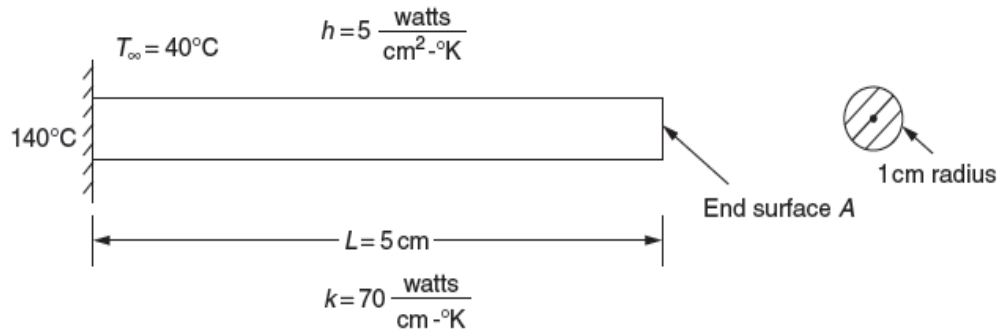
OR

9. (a) A 20-cm thick wall of an industrial furnace is constructed using fireclay bricks that have a thermal conductivity of k = 2 W/m-°C. During steady state operation, the furnace wall has a temperature of 800°C on the inside and 300°C on the outside. If one of the walls of the furnace has a surface area of 2 m² (with 20-cm thickness), find the rate of heat transfer and rate of heat loss through the wall.   [5M]

[5M]

(b) A metal pipe of 10-cm outer diameter carrying steam passes through a room. The walls and the air in the room are at a temperature of 20°C while the outer surface of the pipe is at a temperature of 250°C. If the heat transfer coefficient for free convection from the pipe to the air is h = 20 W/m²-°C find the rate of heat loss from the pipe.

10. For the two-bar truss shown in Figure below, determine the nodal displacements, element stresses and support reactions. A force of P=1000kN is applied at node-1. Assume E=210GPa and A=600mm2 for each element.   [10M]

Figure two-bar truss.
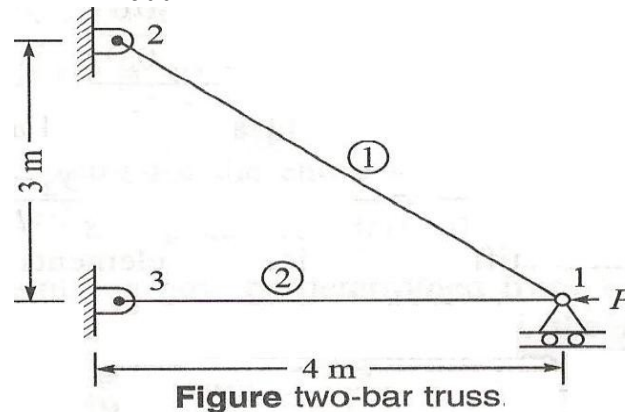
OR

11. A bar of length 1 m; cross sectional area 100 mm2; density of 7 gm/cc and Young's modulus 200Gpa is fixed at both the ends. Consider the bar as three bar elements and determine the first two natural frequencies and the corresponding mode shapes. Discuss on the accuracy of the obtained solution   [10M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester supplementary Examinations, Nov/Dec 2018
Heat Transfer
(ME)

Roll No										

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

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 10 marks.

******

PART – A   (25 Marks)

1. (a) Describe the mechanism of heat transfer by convection (2M)
   (b) A metallic plate of 3 cm thick is maintained at 400 ^{0}C on one side and 100 ^{0}C on the other. How much heat is transferred through the plate per unit area? If thermal conductivity of the plate is (K) = 370 W/mK (3M)
   (c) Distinguish between laminar and turbulent flow (2M)
   (d) Explain about hydro thermal boundary layer concept (3M)
   (e) State Stefan Boltzmann's law (2M)
   (f)) what is a black body? How does it differ from a grey body? (3M)
   (g) How are the heat exchangers classified? (2M)
   (h) What are fouling factors? Explain their effect in heat exchanger design. (3M)
   (i) Explain briefly the term mass transfer. (2M)
   (j) List the various modes of mas transfer and briefly explain about any one type of mass transfer. (3M)

PART – B   (50 Marks)

SECTION – I
2. What is the critical thickness of insulation on a small diameter wire or pipe? Explain its physical significance and derive an expression for the same. (10M)

(OR)

3. Derive the equation for a heat transfer through a composite wall as Q= ΔT/$\sum$R in which ΔT is the temperature difference and is the $\sum$R total resistance (10M)

SECTION – II
4. An air stream at 0 ^{o}C is flowing along a heated plate at 90 ^{o}C at a speed of 75 m/sec the plate is 45 cm long and 60 cm wide. Assuming the transition of the boundary layer to take place at Re_{cx} = 5X10^5 calculate the average values of friction coefficient and heat transfer coefficient for the full length of the plate. Hence calculate the rate of energy dissipation from the plate (10M)

(OR)

5. Air stream at 27 ^{0}C is moving at 0.3m/sec across a 100 W electric bulb at 127 ^{0}C. if the bulb is approximated by a 60 mm diameter sphere, estimate the heat transfer rate and the percentage of power loss due to convection (10M)

SECTION – III
6. Two parallel plates of size 1.0 mX1.0 m spaced 0.5 m apart are located in a large room, the walls of which are maintained at a temperature of 27 ^{0}C. One plate is

maintained at a temperature of 900 ^{0}C and the other at 400 ^{0}C and their emissivities are 0.2 and 0.5 respectively. If the plates exchange heat between themselves and surroundings, find the net heat transferred to each plate and the room. Consider only the plate surfaces facing each other. (10M)

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

7. Calculate the net radiant heat exchange per m^2 area for two large parallel plates at temperature of 427 ^{0}C and 27 ^{0}C respectively. ε (hot plate) = 0.9 and ε(cold plate) = 0.6. If a polished aluminum shield is placed between them, find the percentage reduction in the heat transfer, ε (shied) = 0.4. (10M)

<div align="center">**SECTION – IV**</div>

8. Hot oil with a capacity rate of 2500 W/K flows through a double pipe heat exchanger. It enters at 360 ^{0}C and leaves at 300 ^{0}C. Cold fluid enters at 30 ^{0}C and leaves at 200 ^{0}C. If the overall heat transfer coefficient is 800W/m^{2}K. Determine the heat exchanger area required for a) parallel flow and   b) counter flow.(10M)

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

9. Distinguish between film wise and drop wise condensation. Which of the two gives a higher heat transfer heat transfer coefficient? Why? (10M)

<div align="center">**SECTION – V**</div>

10. .Derive the general mass transfer equation in Cartesian coordinates. (10M)

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

11. The molecular weights of the two components A and B of the gas mixture are 24 and 28 respectively. The molecular weight of gas mixture found to be 30. If the mass concentration of the mixture is 1.2 kgm^3, determine the following. i). Molar fractions, ii).mass fractions and iii). Total pressure if the temperature of the mixture is 290K. (10M)

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

<div align="right">

R15

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester supplementary Examinations, Nov/Dec 2018
Machine Design-II
(ME)

Roll No										

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

Note: This question paper contains two parts A and B

Part A is compulsory which carriers 25 marks and Answer all questions.

Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE Questions, Choosing ONE Question   from each SECTION and each Question carries 10 marks.

*****

PART – A   (25 Marks)

Q. No. 1.
  (a) What is the difference between full journal and partial journal bearing?   2 M
  (b) What is Bearing Characteristic Number and Bearing Modulus?   3 M
  (c) State the function of Piston Rings and Piston Skirt for an IC engine piston.   2 M
  (d) Explain Full-Floating and Semi-Floating type of connection between piston pin and small end of connecting with neat sketches.   3 M
  (e) What are the factors affects the amount of power transmission in belt drive?   2 M
  (f) Under what circumstances a fibre rope and a wire rope is used? What are the advantages of a wire rope over fibre rope?   3 M
  (g) What is the advantage of herringbone gear over single helical gear?   2 M
  (h) What condition must be satisfied in order that a pair of spur gears may have a constant velocity ratio?   3 M
  (i) How does the helix angle influence on the efficiency of square threaded screw?   2 M
  (j) What is self locking property of threads and where it is necessary?   3 M

PART – B   (50 Marks)
SECTION – I

Q. No. 2
  a) Select a ball bearing to carry satisfactorily a 65 kN radial load together with 10 kN of thrust load. The journal supported by the bearing rotates at 1400 rpm for an estimated 0.1 million hours of life. The journal diameter is 100 mm.   **5 M**
  b) A 80 mm long journal bearing supports a load of 2800 N on a 50 mm diameter shaft. The bearing has a radial clearance of 0.05 mm and the viscosity of the oil is 0.021 kg / m-s at the operating temperature. If the bearing is capable of dissipating 80 J/s, determine the maximum safe speed.   **5 M**

OR

Q. No. 3
  A 100 mm long and 60 mm diameter journal bearing supports a load of 2500 N at 600 r.p.m. If the room temperature is 20°C, what should be the viscosity of oil to limit the bearing surface temperature to 60°C? The diametral clearance is 0.06 mm and the energy dissipation coefficient based on projected area of bearing is 210 W/m²/°C.   **10M**

Q. No. 4

Design a connecting rod of I cross section for an automobile diesel engine of the following specifications.

Diameter of cylinder=100mm

Stroke length =125mm

Maximum combustion pressure =2.8MPa

Maximum engine speed=2000rpm

Weight of the reciprocating parts =1.1kg

Length of connecting rod between centers=31.5cm

Assume an allowable crushing stress =3000kg/cm^2.   **10 M**

OR

Q. No. 5

Design a plain carbon steel centre crankshaft for a single acting four stroke single cylinder engine for the following data:

Bore = 400 mm ; Stroke = 600 mm ; Engine speed = 200 r.p.m. ; Mean effective pressure = 0.5 N/mm^2; Maximum combustion pressure = 2.5 N/mm^2; Weight of flywheel used as a pulley = 50 kN; Total belt pull = 6.5 kN.

When the crank has turned through 35° from the top dead centre, the pressure on the piston is 1N/mm^2 and the torque on the crank is maximum. The ratio of the connecting rod length to the crank radius is 5. Assume any other data required for the design.   **10M**

SECTION – III

Q. No. 6

A V-belt drive system transmits 100 kW at 475 r.p.m. The belt has a mass of 0.6 kg/m. The maximum permissible tension in the belt is 900 N. The groove angle is 38° and the angle of contact is 160°. Find minimum number of belts and pulley diameter. The coefficient of friction between belt and pulley is 0.2.   **10 M**

OR

Q. No. 7

An extra flexible 8 × 19 plough steel wire rope of 38 mm diameter is used with a 2m diameter hoist drum to lift 50 kN of load. Find the factor of safety (ratio of the breaking load to the maximum working load) under the following conditions of operation :

The wire rope is required to lift from a depth of 900 metres. The maximum speed is 3 m / s and the acceleration is 1.5 m / s^2, when starting under no slack condition. The diameter of the wire may be taken as 0.05 d, where d is the diameter of wire rope. The breaking strength of plough steel is 1880 N/mm^2 and modulus of elasticity of the entire rope is 84 × 103 N/mm^2. The weight of the rope is 53 N/m length.   **10 M**

SECTION – IV

Q. No. 8

What should be the module, face width and number of teeth on each gear of a pair of spur gears, a C45 steel pinion driving a cast iron gear, if they are to transmit 18.75 kW at 700 rev/min of the 0.18m pinion in continuous service? The velocity ratio is 3, the teeth are 200 full depth and the load is smooth. Determine the outside and root diameters.   **10 M**

OR

Q. No. 9

Two parallel shafts are connected by a pair of steel helical gears. The power transmitted is 15kW at 4000rpm of the pinion. The safe static strength for the material is 100MPa. Gear ratio is 4:1 Stub teeth with 20^0 pressure angle in diameter plane have helix angle of 45^0. Also calculate the necessary BHN with the standard point of wear. Check the design for dynamic load and suggest modification if necessary. Use 30 teeth on the pinion.   **10 M**

SECTION – V

Q. No. 10

The screw of a press has square threads and is 60 mm nominal diameter. The maximum unsupported length is 40 mm. The screw is made of 25C4 steel and the nut is of phosphor bronze. Determine the capacity of the press and length of the nut. If the coefficient of friction for the threads is 0.15 and 0.14 for the thrust collar, determine the necessary torque, taking outside and inside diameter of thrust collar to be 100 mm and 30 mm respectively.   **10 M**

OR

Q. No. 11

A machine slide weighing 3000 N is elevated by a double start acme threaded screw at the rate of 840 mm/min. If the coefficient of friction be 0.12, calculate the power to drive the slide. The end of the screw is carried on a thrust collar of 32 mm inside diameter and 58 mm outside diameter. The pitch of the screw thread is 6 mm and outside diameter of the screw is 40 mm. If the screw is of steel, is it strong enough to sustain the load?   **10 M**

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester supplementary Examinations, Nov/Dec 2018
Production and Operations Management
(ME)

Roll No										

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

Note: This question paper contains two parts A and B
Part A is compulsory which carriers 25 marks and Answer all questions.
Part B Consists of 5 SECTIONS (One SECTION for each UNIT). Answer FIVE
Questions, Choosing ONE Question from each SECTION and each Question carries
10 marks.

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

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PART – A   (25 Marks)

1. Answer the following
- **a.** What are the Basic functions of Production Planning and Control? [2M]
- b. Brief on the characteristics of process technologies. [3M]
- c. What do you understand by aggregate planning and its purpose? [2M]
- d. Write brief notes on Replacement policies. [3M]
- e. Discuss the role of Quality Circles in Quality Control. [2M]
- f. Brief on various techniques in the Methods Study [3M]
- g. Make a note on techniques for prioritization of materials[2M]
- h. What are the determinants of vendor rating? [3M]
- i. Brief on the objectives of stores management. [2M]
- j. Explain the importance of cost reduction procedures in inventory control. [3M]

PART –B   (50 Marks)
SECTION – I

2. Discuss the production and operations management functions (decision areas) and brief on - Interface between the operation systems and systems of other functional areas. [10M]

(OR)

3. "Production planning is an integral part of the total corporate planning effort" justify the statement and brief on process planning, process design. [10M]

SECTION – II

4. "The aggregate plan in made within the broad frame work of the long-range plan" justify the statement with an illustration and brief on the merits and demerits of the transportation problem method of aggregate planning. [10M]

(OR)

5. Distinguish between loading and scheduling and discuss the principles, techniques applicable for scheduling the operations in the service industry. [10M]

SECTION – III

6. What do you understand by quality control, basic aspects of assuring quality and make a detailed note on statistical process control concepts. [10M]

(OR)

7. Explain the relationship between method study & time study and discuss the application of work measurement techniques in detail. [10M]

SECTION – IV

8. Explain the objectives, the various functional areas of the materials management and brief on Material requirements planning in production planning and inventory control system. [10M]

(OR)

9. Discuss the techniques for prioritization of materials sources of supply of materials and state the methods of evaluation of vendors under various circumstances. [10M]

SECTION – V

10. Discuss the objectives, requirements for efficient stores management. [10M]

(OR)

11. Provide a detailed note on importance of cost reduction concepts and elaborate the importance of ABC analysis, XYZ analysis and VED analysis in inventory control. [10M]

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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous Institution – UGC, Govt. of India)
III B.TechII Semester Supplementary Examinations, October/November 2020
Refrigeration and Air Conditioning
(ME)

Roll No										

Time: 2 hours   **Max. Marks: 75**

Answer Any **Four** Questions
All Questions carries equal marks
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Q. No. 1) Derive the expression for COP of Carnot vapour compression refrigeration system.

Q. No. 2) Explain the working principle of Regenerative air refrigeration system with the help

of configuration diagram and temperature-entropy diagram.

Q. No. 3) Draw the vapour compression refrigeration cycle on T-s diagram when the refrigerant is

dry and saturated at the end of compression and find an expression for the C.O.P in terms

of (i) Temperature and entropies; (ii) Enthalpy.

Q. No. 4) Briefly explain the working of two stage compression with water intercooler and liquid

sub-cooler employed for vapour compression system.

Q. No. 5) With a neat sketch explain the working principle of a three fluid vapour absorption

refrigeration system.

Q. No. 6) Draw the T-s and h-s diagrams representing steam jet refrigeration system.

Q. No. 7) Define room sensible heat factor. How room sensible heat factor line is drawn on the

psychrometric chart?

Q. No. 8) Explain about Grills and Registers along with their performance effects.

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Code No: **R15A0327**

R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH~~NOLO~~GY
(Autonomous Institution – UGC, Govt. of India)
III B.TechII Semester Supplementary Examinations, Oct/Nov 2020
Composite Materials
(ME)

Roll No									

Time: 2 hours   **Max. Marks: 75**

Answer Any **Four** Questions
All Questions carries equal marks.
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1   (a) What is a Composite material ? How do you classify them.
(b) Write short notes on (i) Fiber reinforced Composites (ii) Particle reinforced Composites.

2   a) What are important characteristics of boron carbide fibers? How they are produced.
b) Differentiate between thermo sets and thermo plastics.

3   Explain the autoclave moulding process with neat sketch enumerating the possible defects

4   Explain the centrifugal casting process with neat sketch enumerating the possible defects

5   Derive an expression for the young's modulus of composite in transverse direction

6   Sketch the stress- strain curve for unidirectional laminate and explain its significant points

7   a) A polymer composite has 60% glass fiber in epoxy matrix. If the elastic moduli of glass is 85GPa and that of epoxy is 3.4GPa.Compute
             i) Modulus of elasticity of the composite in fiber direction
             ii) Modulus of elasticity of the composite in transverse direction
b) What is Cross-Ply lamina? What are its specific features?

8   Explain the various bond strengths of composites with merits and demerits
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MALLA REDDY COLLEGE OF ENGINEERING & TECHNOL **R15**

(Autonomous Institution – UGC, Govt. of India)
III B.Tech II Semester Supplementary Examinations, October/November 2020
Finite Element Method
(ME)

Roll No										

Time: 2 hours   **Max. Marks: 75**

Answer Any **Four** Questions
All Questions carries equal marks.
***

1   Briefly describe the general procedure of finite element analysis.

2   An axial load P =300X10^{3}N is applied at 20^0 C to the rod as shown in Figure below.

The temperature is the raised to 60^0 C a) Assemble the K and F matrices b) Determine the nodal displacements and stresses
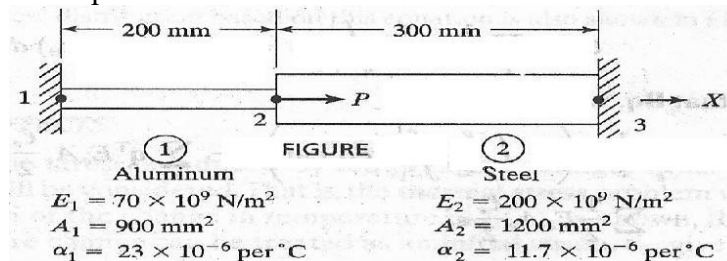

3   Determine the stiffness matrix, stresses and reactions in the truss structure shown in Figure.
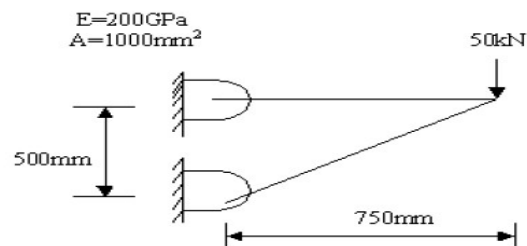
4   Estimate the displacement vector, strains, stresses and reactions in the truss structure shown below in figure. Take A = 1000 mm^2 and E = 200 GPa
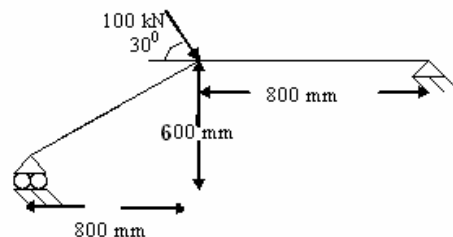
5   An axisymmetric body with a linearly distributed load on the conical surface is shown in Fig. Determine the equivalent point loads at nodes 2, 4 and 6.
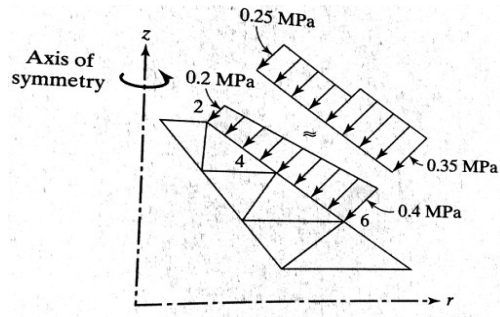
6   An Isoparametric constant strain triangular element is shown in Figure.
       i) Evaluate the shape functions N1, N2 and N3 at an intermediate point P for the triangular element.
       ii) Determine the Jacobean of transformation J for the element.

Node 3 (4, 7)
Node 2 (7, 3.5)
P(x = 3.85 , y = 4.8)
Node 1 (1.5, 2)
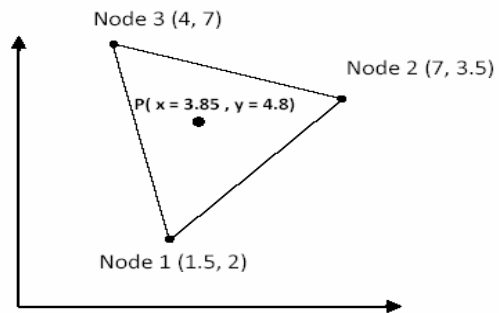
7   Describe heat transfer analysis for straight fin

8   Obtain the Eigen values and Eigen vectors for the cantilever beam of length 2 m using consistent mass for translation DOF with $E = 200GPa$, $\rho = 7500kg/m^3$.

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH ~~GY~~
(Autonomous Institution – UGC, Govt. of India)
III B.TechII Semester Supplementary Examinations, October/November 2020
Heat Transfer
(ME)

Roll No										

Time: 2 hours   **Max. Marks: 75**

Answer Any **Four** Questions
All Questions carries equal marks.
***
NOTE: Data books are allowed

1   A furnace wall is built up of two layers laid of fireclay 12cm thick and red brick 25 cm thick while the annular space between the two is filled with diatomite brick (15cm). What should be the thickness of the red brick layer if the wall is to be constructed without diatomite brick, so that the heat flow through the wall remains constant? The thermal conductivities of fireclay, diatomite and red brick being 0.929, 0.129 and 0.699 W/m^{0}c respectively

2   Derive the heat conduction equation in a cylindrical coordinate system.

3   Discuss briefly thermal and hydrodynamic boundary layer and obtain Reynold's analogy in forced convection.

4   Determine the heat transfer rate by free convection from a plate 0.3m × 0.3m for which one surface is insulated and the other surface is maintained at 110^{0}C and exposed to atmosphere air at 30^{0}C for the following arrangements:
a) The plate is vertical
b) The plate is horizontal with the heating surface facing up
c) The plate is horizontal with the heating surface facing down

5   Derive an expression for the shape factor in case of a radiation exchange between two surfaces

6   A room 4×4 m square by 3 × 3 m height has one side wall maintained at 260^{0}C; the floor is maintained at 90^{0}C. The other four surfaces are perfectly insulated assume that all surfaces are black. Calculate the net heat transfer between the hot wall and the cool floor

7   A cross-flow heat exchanger with both fluids unmixed is used to heat water (Cp= 4.18 kJ/kgK) from 50^{0}C to 90^{0}C, flowing at the rate of 1.0 kg/s. Determine the overall heat transfer coefficient if the hot engine oil (Cp= 1.9 kJ/kgK) flowing at the rate of 3 kg/s enters at 100^{0}C. The heat transfer area is 20 m^2.

8   a)   Derive the general mass transfer equation in Cartesian coordinates.
    b)   The molecular weights of two components A and B of a gas mixture are 24 and 28 respectively. The molecular weight of gas mixture is found to be 30. If the mass concentration of the mixture is 1.2 kg/m^3 , determine i) Molar fractions, ii) mass fractions, iii) Total pressure if the temperature of the mixture is 290K.

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R15

MALLA REDDY COLLEGE OF ENGINEERING & TECH   GY
(Autonomous Institution – UGC, Govt. of India)
III B.TechII Semester Supplementary Examinations, October/November 2020
Machine Design - II
(ME)

Roll No									

Time: 2 hours   **Max. Marks: 75**

Answer Any **Four** Questions
All Questions carries equal marks.
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Note: Machine Design Hand books are permitted.

1 (a) What are the dimensionless parameters used in designing hydrodynamic bearing? Explain their significance.
   (b) A ball bearing subjected to a radial load of 4000N is expected to have a satisfactory life of 12000 hours at 720r.p.m with a reliability of 95%.Calculate the dynamic load capacity of the bearing so that it can be selected from manufacturer's catalogue based on 90% reliability.

2 (a) What are the characteristics of a good bearing material?
   (b) A rolling contact bearing is subjected to the following work cycle:
   (i) Radial load of 6000N at 150 r.p.m for 25% of the time;
   (ii) Radial load of 7500N at 600 r.p.m for 20% of the time; and
   (iii) Radial load of 2000N at 300 r.p.m for 55% of the time.
   The inner ring rotates and loads are steady .Select a bearing for an expected average life of 2500 hours.

3 Design a piston, piston rings and gudgeon pin for a single four stroke engine for the following given data:
   Cylinder bore = 100mm
   Stroke = 125mm
   Maximum gas pressure = 5MPa
   b.m.e.p = 0.6MPa
   Fuel consumption = 0.15kg/brake kW/hr
   Speed = 1500rpm

4 Design completely a connecting rod, the bolts for the big end cap for a medium speed, four cylinders I.C. Engine, given the following data:
   Piston diameter = 100mm
   Stroke = 125mm
   Weight of reciprocating parts = 1.1kg
   Length of the connecting rod = 313cm
   RPM of the engine-normal = 1200
   RPM of the engine-over speed = 2000
   Maximum explosion pressure = 2.8MPa
   State clearly the values adopted for the factors of safety and the ultimate stresses and underline them. Draw freehand sketch to about full size , a proportionate elevation of the connecting rod and add either an end view or a sectional plan.

5   A belt drive consists of two V-belts in parallel, on grooved pulleys of the same size. The angle of the groove is 30°. The cross-sectional area of each belt is 750 mm^2 and μ = 0.12. The density of the belt material is 1.2 Mg / m3 and the maximum safe stress in the material is 7 MPa. Calculate the power that can be transmitted between pulleys of 300 mm diameter rotating at 1500 r.p.m. Find also the shaft speed in r.p.m. at which the power transmitted would be a maximum.

6   Design a rubber belt to drive a dynamo generating 20 kW at 2250 rpm and fitted with a pulley 200 mm diameter. Assume dynamo efficiency to be 85%. Take Allowable stress for belt = 2.1 MPa; Density of rubber = 1000 kg/m3; Angle of contact for dynamo pulley = 165° and coefficient of friction between belt and pulley = 0.3.

7   A pair of helical gears are to transmit 15 kW. The teeth are 20° stub in diametral plane and have a helix angle of 45°. The pinion runs at 10 000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear, given σes = 618 MPa.

8   A double-threaded power screw, with ISO metric trapezoidal threads is used to raise a load of 300 kN. The nominal diameter is 100 mm and the pitch is 12 mm. The coeffi cient of friction at the screw threads is 0.15. Neglecting collar friction, calculate (i) torque required to raise the load; (ii) torque required to lower the load; and (iii) effi ciency of the screw.

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MALLA REDDY COLLEGE OF ENGINEERING & TECHnology
(Autonomous Institution – UGC, Govt. of India)
III B.TechII Semester Supplementary Examinations, October/November 2020
Production and Operations Management
(ME)

Roll No									

Time: 2 hours   **Max. Marks: 75**

Answer Any **Four** Questions
All Questions carries equal marks.
***

1   Is the production and operations management function getting to be increasingly people –centric? If so, what may be the reasons?

2   Discuss the relationship between product life cycle and process life cycle.

3   How do the location problems for a manufacturing industry, a government hospital, a fire stations, a new metro station and a higher primary schools differ from one another?

4   What do you mean process layout? Explain its advantages and limitations with a neat sketch.

5   The following data are found during the inspection of the first 15 samples of size 100 each from a lot of two-wheelers manufactured by an automobile company:

Sample Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Number of Defectives	3	4	6	2	12	5	3	6	3	5	4	15	5	2	3

Draw the chart for fraction defective (p) and comment on the state of control.

6   Why method study is important? Discuss its basic procedure in detail.

7   Discuss vendor evaluation and rating. Give a list of factors to be considered.

8   What is the function of a safety stock or buffer stock? What are all the different uncertainties against which you would like to protect the Inventory?

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