

Enrollment No.

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B.

3

B.TECH (ME)
III YEAR, V SEMESTER EXAMINATION
SOCIOLOGY, SOCIETY AND CULTURE

[Max. Marks : 70]

[Time : 03:00 Hours]

NOTE:- ATTEMPT ALL THE QUESTIONS AS PER GIVEN INSTRUCTIONS.

QUESTION NO.-1: ATTEMPT ANY FOUR PARTS.

(4*3=12)

- What is the scope of sociology?
- Describe varnashrama system of ancient India.
- Explain modern religious practices.
- What are the problems faced by women in ancient India.
- Explain stages of life according to Indian literature.

QUESTION NO.-2: ATTEMPT ANY THREE PARTS.

(3*4=12)

- Why sociology is important to society?
- Describe any two social reformer societies of 18th-19th centuries.
- Explain the script of Harappan civilization.
- Explain Sangama and Buddhist literature.

QUESTION NO.-3: ATTEMPT ANY THREE PARTS.

(3*6=18)

- Explain socio religious reform movements of 19th Century.
- Explain the reasons of decline of Harappa civilization.
- What are the current developments in arts and culture?
- Define Vedic and later Vedic periods.

QUESTION NO.-4: ATTEMPT ANY TWO PARTS.

(2*7=14)

- Explain the architecture of ancient India.
- What is the contribution of Indian culture to world?
- What are 3 types of cultural heritages?

QUESTION NO.-5: ATTEMPT ANY TWO PARTS.

(2*7=14)

- Explain Harappan civilization.
- Explain the town planning system of Indus civilization.
- Explain are the Indian art traditions.

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Paper Code : - BME-504

(A) (SVSU) : 2024-2025/R

Enrollment No.

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B.TECH (ME)

**III YEAR, V SEMESTER EXAMINATION
KINEMATICS AND THEORY OF MACHINES**

Time : 03:00 Hours]

[Max. Marks : 70]

Note: All questions are compulsory, and the scientific calculator is allowed.

Q.1 Attempt any two of the following**(7X2=14)**

- Define a kinematic link and discuss their classification.
- Explain all the inversions of Double Slider Crank Chain mechanism.
- State and explain the Grashoff's law for a plain mechanism.

Q.2 Attempt any two of the following**(7X2=14)**

- What are types of gear discussing with their applications
- In two meshing spur gears the module is 2mm and no of teeth on the pinion is 15 and on gear 45. Determine the pitch circle radii of both gear and circular pitch and radial pitch of respective gears.
- Explain Whitworth quick return motion mechanism with neat sketch.

Q.3 Attempt any two of the following**(7X2=14)**

- What are types of followers explain with neat sketch.
- Explain all the terminology associated with the Cam and follower mechanism.
- Draw the profile of the cam when the roller follower moves with cycloidal motion during out stroke and return stroke as given below.
 - Out stroke with maximum displacement of 31.4 mm during 180 degree of cam rotation.
 - Return stroke for the next 150 degree of cam rotation.
 - Dwell for the remaining 30 degree of cam rotation.

The minimum radius of the cam is 15 mm and roller diameter of the follower is offset by 10 mm towards right from the axis of the cam shaft.

Q.4 Attempt any two of the following**(7X2=14)**

- What are types of gear trains, explain with neat sketch.
- In a Simple gear train, no of teeth on the driver is 19 and the no of teeth on the driven is 20. What is the ratio of their diameter?
- Explain path of contact, arc of path of contact, length of path of contact.

Q.5 Attempt any two of the following**(7X2=14)**

- What are types of belt drive explain with neat sketch diagram.
- Derive the expression for length of cross belt drive.
- State and prove the condition of maximum power transmission for a belt drive.

17-12-24

Printing Pages : 1

Paper Code : - BME-502

(B) (SVSU) : 2024-2025/R

Enrollment No.

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B.TECH (ME)
III YEAR, V SEMESTER EXAMINATION
SOLID MECHANICS (BME-502)

[Time : 03:00 Hours]

[Max. Marks : 70]

NOTE: All questions are compulsory, and the scientific calculator is allowed.

Q1. Attempt any two of the following:**2x7 = 14**

- Explain the maximum principal stress theory of the theory of failure.
- Explain the maximum shear stress theory of the theory of failure.
- In metallic body the principal stresses are $+40 \text{ MN/m}^2$ and -95 MN/m^2 , the third principal stress being zero. The elastic limit stress in simple tension as well as in simple compression is equal and is 220 MN/m^2 . Find the factor of safety based on the elastic limit if the criterion of failure for the material is the maximum principal stress theory.

Q2. Attempt any two of the following:**2x7 = 14**

- Derive the expression for stress developed in the wire winding cylinder.
- Calculate the thickness of the metal required for a cast-iron main 700 mm in diameter for water at a pressure head of 100 m if the maximum permissible tensile stress is 20 MN/m^2 and weight of water is 10 KN/m^3 .
- A boiler shell is to be made of 20 mm thick plate having tensile stress of 120 MN/m^2 . If the efficiencies of the longitudinal and circumferential joints are 70% and 30% respectively, determine maximum permissible diameter of the shell for an internal pressure of 2 MN/m^2 .

Q3. Attempt any two of the following:**2x7 = 14**

- A solid steel shaft has to transmit 75 kW at 250 rpm. Taking allowable shear stress $\tau = 70 \text{ MN/m}^2$, find a suitable diameter for the shaft, if the maximum torque transmitted on each revolution exceeds the mean by 30%.
- How is the torsion equation for a circular shaft derived?
- What must be the length of a 5 mm diameter aluminium wire so that it can be twisted through one complete revolution without exceeding a shearing stress of 45 MN/m^2 ?

Q4. Attempt any two of the following:**2x7 = 14**

- Explain the mathematical derivation of the generalized Hooke's law.
- A concrete cylinder of diameter 150 mm and length 350 mm when subjected to an axial compressive load of 240 kN resulted in an increase of diameter by 0.127 mm and a decrease in length of 0.28 mm. Compute the value of Poisson's ratio and modulus of elasticity.
- The principal stresses in the wall of a container are 50 MN/m^2 and 80 MN/m^2 . Determine the normal, shear, and resultant stresses in magnitude and direction in a plane, the normal of which makes an angle of 30° with the direction of maximum principal stress.

Q5. Attempt any two of the following:**2x7 = 14**

- Derive an expression for the relation between E , μ , and K .
- Define the terms: - Hook's Law and Poisson's Ratio, Stress-Strain, Neutral axis
- Draw and explain each point of the stress-strain diagram for mild steel.

Printing Pages : 1

Paper Code : - BME-501

(F) (SVSU) : 2024-2025/R

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B.TECH (ME)
III YEAR, V SEMESTER EXAMINATION
HEAT TRANSFER (BME-501)

[Time : 03:00 Hours]

[Max. Marks : 70]

NOTE: All questions are compulsory and scientific calculator is allowed.

Q1. Attempt any two of the followings:

2x7=14

- Plot the temperature profile of parallel and counter flow heat exchanger.
- A plane wall is 25 cm thick with an area of 1 m^2 , and has a thermal conductivity of 0.5 W/mK . If a temperature difference of 60°C is imposed across it, what is the heat flow?
- A stainless steel tube ($k_s = 19 \text{ W/mK}$) of 2 cm ID and 5 cm OD is insulated with 3 cm thick asbestos ($k_a = 0.2 \text{ W/mK}$). If the temperature difference between the innermost and outermost surfaces is 600°C , Calculate the heat transfer rate per unit length.

Q2. Attempt any two of the followings:

2x7=14

- What is LMTD? Derive it's formula for parallel flow.
- A fin has 5mm diameter and 100 mm length. The thermal conductivity of fin material is $400 \text{ Wm}^{-1}\text{K}^{-1}$. One end of the fin is maintained at 130°C and its remaining surface is exposed to ambient air at 30°C . If the convective heat transfer coefficient is $40 \text{ Wm}^{-2}\text{K}^{-1}$, Find the heat loss (in W) from the fin.
- A copper pipe carrying refrigerant at -200°C is covered by cylindrical insulation of thermal conductivity 0.5 W/m K . The surface heat transfer coefficient over the insulation is $50 \text{ W/m}^2 \text{ K}$. Calculate the critical thickness of the insulation.

Q3. Attempt any two of the followings:

2x7=14

- Consider two concentric cylinders having diameters 10cm and 20cm and a length of 20cm. Designating the open ends of cylinders as surfaces 3 and 4, estimate the shape factor, F_{3-4}
- Discuss the different types of processes for condensation of vapours on a solid surface.
- A spherical thermocouple junction of diameter 0.706 mm is to be used for the measurement of temperature of a gas stream. The convective heat transfer co-efficient on the bead surface is $400 \text{ W/m}^2\text{K}$. Thermo physical properties of thermocouple material are $k = 20 \text{ W/mK}$, $C = 400 \text{ J/kg, K}$ and $\rho = 8500 \text{ kg/m}^3$. If the thermocouple initially at 30°C is placed in a hot stream of 300°C , then find time taken by the bead to reach 298°C .

Q4. Attempt any two of the followings:

2x7=14

- Discuss Absorptivity, Reflectivity and Transmissivity
- In a counter flow heat exchanger, for the hot fluid the heat capacity = 2 kJ/kg K , mass flow rate = 5 kg/s , inlet temperature = 150°C , outlet temperature = 100°C . For the cold fluid, heat capacity = 4 kJ/kg K , mass flow rate = 10 kg/s , inlet temperature = 20°C . Neglecting heat transfer to the surroundings, the outlet temperature of the cold fluid in $^\circ\text{C}$ is:
- A solid cylinder (surface 2) is located at the centre of a hollow sphere (surface 1). The diameter of the sphere is 1 m, while the cylinder has a diameter and length of 0.5 m each. The radiation configuration factor F_{11} is:

Q5. Attempt any two of the followings:

2x7=14

- Draw the boiling curve and identify the different boiling regimes. Also, explain the characteristics of each regime
- Two large parallel grey plates with a small gap, exchange radiation at the rate of 1000 W/m^2 when their emissivities are 0.5 each. By coating one plate, its emissivity is reduced to 0.25. Temperature remains unchanged. The new rate of heat exchange shall become:-
- What is Fourier law? Write its assumptions.
