22558

Seat No. ⬜⬜⬜⬜⬜⬜⬜

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any FIVE of the following:** **10**

a) State different modes of failure of automobile components.

b) Define the terms
   (i) Factor of safety
   (ii) Working stress

c) State and justify material for leaf spring.

d) List the functions of cylinder block.

e) State and justify material for push rod.

f) Describe aesthetics in automobile component design.

g) Sketch the method to reduce stress concentration in cylindrical members with holes.

Marks

2. **Attempt any THREE of the following:** **12**

a) List basic design requirements of connecting rod.

b) State any two uses of each of the following,

   (i)   Stress-strain diagram

   (ii) S-N curve

c) Why nipping is provided in leaf spring?

d) Describe the design procedure for rocker arm.

3. **Attempt any THREE of the following:** **12**

a) Describe the design procedure of front axle.

b) Explain design procedure for fully floating rear axle.

c) Describe design procedure of valve spring.

d) Explain the terms preferred number and standardization.

e) Explain the maximum principal stress theory.

4. **Attempt any TWO of the following:** **12**

a) Design the diameter of rear axle shaft for fully floating type with following data–

Engine power$=60$KW at 3000rpm

Gear box ratio$=4.5:1,\ 2.5:1,\ 1.6:1,\ 1:1$

Differential reduction$=5:1$

f_s for the shaft$=70$N/mm^2.

b) A multi disc clutch has 5 plates having 4 pairs of active friction surface if the intensity of pressure is not be exceed 0.127N/mm^2. Find the power transmitted at 500 r.p.m. The outer and inner raddi of friction surfaces are 125mm and 75mm respectively. Assume uniform wear and take coefficient of friction $=\ 0.3$.

c) Design the piston pin with following data–

Maximum pressure on piston$=4\,\text{N}/\text{mm}^2$

Diameter of piston$=70\,\text{mm}$

Allowable stresses due to bearing and bending and shearing are given $30\,\text{N}/\text{mm}^2$, $80\,\text{N}/\text{mm}^2$ and $60\,\text{N}/\text{mm}^2$ respectively.

5.   **Attempt any TWO of the following:**   **12**

a) State functions and name suitable materials for connecting rod. Select suitable cross-section for connecting rod with justification.

b) State functions and material for front axle. Draw proportionate diagram of front axle showing cross-sections at different positions.

c) Explain basic automobile component design procedure.

6.   **Attempt any TWO of the following:**   **12**

a) Define stress concentration. State its causes. Explain different methods to reduce stress concentration with suitable examples.

b) Explain design procedure for propeller shaft.

c) A truck spring has 10 numbers of leaves. The supports arc 1185 mm apart and the central (Support) is 85 mm wide. The load on the spring is 20 KN and takes permissible stress of $300\,\text{N}/\text{mm}^2$. Determine the thickness of the leaves if the width of spring is 85 mm.

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