22558

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3 Hours / 70 Marks 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) List the standard used in design of the piston.

b) Define service factor with their application.

c) State and justify material for leaf spring.

d) Compare advantages and disadvantages of cast iron and aluminium as material for piston.

e) Calculate stroke length and bore length of piston diameter is 100 mm.

f) Describe ergonomics.

g) Explain maximum shear stress theory.

Marks

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

a) List basic design requirements of piston.

b) Define stress concentration. Sketch the remedies to reduce stress concentration in following cases :

i) A plate with V-Notch subjected to tension.

ii) Cylindrical member with shoulder subjected to bending.

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) Write design procedure of front axle.

b) Describe design procedure for connecting rod.

c) Describe design procedure for fully floating rear axle.

d) List reason to adopt standardization.

e) Define factor of safety. Write the factors to be considered while selecting it.

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

a) The rear axle shaft connecting differential to the side wheel is required to transmit 30 KW at 1500 rpm. If maximum torque is 2 times average torque and allowable shear stress in shaft material 80 MPa. Find diameter.

i) Shaft is solid and

ii) Shaft is hollow with outside diameter 1.5 times the inside diameter.

b) Calculate maximum, minimum and average pressure in a plate clutch if axial load is 4 KN. The inside and outside radii of friction lining are 50 and 100 mm respectively.

c) List sequentially steps to design rocker arm.

Marks

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

a) State functions and name suitable materials of the following :
Piston crown, Piston ring and Piston pin.

b) Compare front axle and rear axle with different parameters.

c) Explain basic automobile component design procedure.

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

a) Find the minimum size of hole that can be punched in a 10 mm thick plate having ultimate shear strength of 300 MPa and the maximum allowable compressive strength of punch material is 1000 MPa.

b) Explain in detail the design procedure for propeller shaft including universal coupling.

c) Design a propeller shaft to transmit 5 KW at 5500 rpm with gear box reduction 16:1. Assume shear stress 45 N/mm^2.
