22558

23124

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) Draw strain-strain diagram for Brittle material.

b) Define Factor of safety.

c) Give classification of design.

d) Define :

i) Shaft

ii) Axle

e) List any four materials for Friction clutches.

f) List any four design considerations for design of piston.

g) List the standard's used in design.

Marks

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

a) Design a propeller shaft to transmit 5 KW at 5000 rpm with gearbox reduction of 16:1. Assume permissible shear stress for shaft material as 45 N/mm^2.

b) Draw a neat sketch of stress - strain diagram for ductile material and lable the following points

i) Proportional limit

ii) Modulus of elasticity

iii) Elastic limit

iv) Yield strength

v) Ultimate tensile strength

vi) Breaking point.

c) Explain use of preferred numbers in designing the automobile components.

d) Draw a neat sketch of piston and lable the following.

i) Piston pin

ii) Skirt

iii) Ring section

iv) Thrust side

v) Non-thrust side

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

a) Explain stepwise design procedure for fully floating Rear Axle.

b) Describe modes of failure of the automobile component.

c) Explain maximum principal stress theory.

d) Determine the thickness of plain cylinder head for 300 mm cylinder diameter. The maximum gas pressure is 3.2 N/mm^2 take allowable tensile stress for cylinder cover is 42 N/mm^2 and constant is 0.1

Marks

e) Design the diameter of rear axle shaft for fully floating type with the following data.

i) Gearbox ratio = 4.1

ii) Differential reduction = 6.1

iii) Engine power = 10 kN at 300 rpm

iv) Shear stress for shaft material = 70 N/mm^2

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

a) A multiple disc clutch plate has five plates having four pairs of active friction surfaces. If the intensity of pressure is not to exceed 0.127 N/mm^2. Find power transmitted at 500 rpm the outer and inner radii of friction surfaces are 125 mm and 76 mm respectively. Assume uniform wear and take co-efficient of friction = 0.3

b) Design the connecting rod cross - section with following data of petrol engine.

i) Max. pressure inside the cylinder = 4.5 N/mm^2

ii) Piston diameter = 70 mm

iii) Stroke length = 80 mm

iv) Effective length of connecting Rod = 140 mm

v) Max. allowable stress in the connecting rod in cripping is 100 N/mm^2. Take Rankine constant for steel is 1/1600.

c) Front axle carries a load of 100 kN. Wheel track is 1.4 m. Distance between wheel centre and spring centre is 100 mm. If stress is not to exceed 100 MPa, Find its diameter.

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

a) Describe the design procedure for front Axle.

b) State functions and name the suitable materials of the following piston crown, piston ring, piston pin.

c) State stepwise procedure for component design.

Marks

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 12 numbers of leaves. Two of which are full length leaves. The spring supports are 1.05 m apart and central (support) is 85 mm apart. The central load is 5.4 kN with permissible stress of 280 N/mm^2. Determine thickness and width of steel spring leaves if the ratio of total depth to width of spring is 3.