22558

23242

3 Hours / 70 Marks Seat No. | | | | | | | | |

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

(2) Answer each next main Question on a new page.

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

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) 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) Describe failure of Automobile Components.

b) Define the terms:

i) Working stress

ii) Service factor

c) State and justify material used for tie rod.

d) Describe the function of cylinder block.

e) Determine the stroke length and bore length if piston diameter is 80 mm.

f) Define:

i) Ergonomics

ii) Aesthetic

g) What are the causes of stress concentration

P.T.O.

Marks

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

a) List basic design considerations in Automobile Design.

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

i) S - N curve

ii) Stress strain diagram

c) A semi elliptical leaf spring sustain a load of 80KN. The overall length of the spring is 1 m consists 16 leaves hold together by *U* bolt spaced 100 mm apart with overall depth to width ratio of 2. The allowable stress for spring material is 60 MPa
Take E= 210 KN/mm^2.

d) Explain indicated power and brake power of an engine cylinder.

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

a) Compare front axle and rear axle on basis of force to be supported, stress induced and cross section used.

b) Explain design procedure for I-section of front axle.

c) Explain design procedure for piston ring.

d) Define standardization and state advantages of it.

e) List Factors of selection of factor of safety.

Marks

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

a) The rear axle shaft connecting differential to side wheel is required to transmit 40 KW at 1600 r.p.m. if maximum torque is two times average torque and allowable shear stress is 80 N/mm^2 for axle shaft material, find out diameter of axle shaft if

i) Shaft is solid

ii) Shaft is hollow

With outside diameter 1.6 times inside diameter.

b) A single plate dry clutch transmits 7.5 kw at 900 r.p.m. the axial pressure is limited to 0.7 N/mm^2. If the coefficient of friction is 0.25 find:

i) Mean radius and face width of friction lining assuming ratio of mean radius to face width as 4.

ii) Outer and inner diameter of the clutch plate.

c) Design the piston pin with following data:
Maximum gas pressure = 4 N/mm^2,
Diameter of piston = 70 mm, Allowable stresses due to bearing, bending and shear are 30 N/mm^2, 80 N/mm^2, 60 N/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) Explain design procedure for fully floating rear axle.

c) Explain basic automobile component design procedure.

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

a) Explain theories of failure.

b) Explain design procedure for propeller shaft.

c) A vehicle spring has 12 numbers of leaves. The supports are 1250 mm apart and the central (support) is 85 mm wide. The load on the spring is 25 KN and takes permissible stress of 300 N/mm^2. Determine the thickness of the leaves if the width of spring is 85 mm.
