22558

12425 03 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

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1. Attempt any \underline{FIVE} of the following:

- a) State different modes of failure of Automobile components.
- b) Draw S-N curve and define endurance limit.
- c) State and justify material for leaf spring.
- d) List the function of cylinder block.
- e) Compare advantages and disadvantages of cast iron and aluminium as material for Piston.
- f) State the four considerations in machine design.
- g) Define stress concentration.

2. Attempt any <u>THREE</u> of the following:

- a) Explain basic automobile component design procedure.
- b) Explain Max. principal stress theory.
- c) Design a propeller shaft to transmit 5 kW at 5000 rpm. With gear box reduction 16:1. Assume permissible shear stress for shaft material is 45 N/mm².
- d) List basic design requirements of connecting rod.

3. Attempt any THREE of the following:

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- a) Define:
 - i) Indicated power
 - ii) Brake power
 - iii) Frictional power and state relation between them.
- b) Describe design procedure for fully floating rear axle.
- c) List the important factors that influence the magnitude of F.O.S.
- d) Explain aesthetic consideration in designing automobile components.
- e) State function and material for front axle and rear axle.

4. Attempt any <u>TWO</u> of the following:

- a) The rear axle shaft connecting differential to side wheel is required to transmit 40 kW at 1600 rpm. If maximum torque is two times average torque and allowable shear stress is 80 N/mm² 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) Describe the design procedure for rocker arm.
- c) Explain stepwise procedure for design of a tie rod.

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Marks

5. Attempt any <u>TWO</u> of the following:

a) A 4-stroke diesel engine has the following specifications:

Break power = 6 kW,

Speed = 1200 rpm. Indicated mean effective

Pressure = 0.35 N/mm².

Mechanical efficiency = 80%.

Determine:

- i) Bore and length of cylinder
- ii) Thickness of cylinder head.
- b) Compare front axle and rear axle on basis of force to be supported, stresses induced and cross section used.
- c) Define ergonomics and illustrate ergonomic consideration in design of display in automobiles.

6. Attempt any <u>TWO</u> of the following:

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- a) Draw stress-strain diagram for ductile material and state its important.
- b) A multi disc clutch has 5 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 r.p.m. The outer and inner radii of friction surfaces are 130 mm and 80 mm respectively. Assume uniform wear and take coefficient of friction = 0.35.
- c) Derive the relation for torque to be transmitted by single plate clutch considering uniform wear condition and uniform pressure condition.

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