

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech. (Automobile Engg.) (Sem.-6)**  
**DESIGN OF AUTOMOTIVE COMPONENTS**

Subject Code : BTAE-603-18

M.Code : 79287

Date of Examination : 07-07-22

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**1. Write briefly :**

- a) What do you mean by preliminary design?
- b) Write factors affecting selection of material?
- c) What are thick film lubrications?
- d) Write advantages of helical gear over spur gear.
- e) Define factor of safety.
- f) What is the function of bearings?
- g) What are self-energizing brakes?
- h) What are main design considerations for propeller shaft?
- i) How stress concentration can be minimized?
- j) Name various types of rear axles.

## SECTION-B

2. What properties are required in a material for making a piston?
3. Discuss the role of ergonomics in designing the automotive parts.
4. Discuss different types of wear failure and breakage failure of gear tooth due to static and dynamic loads.
5. Explain the criterion for selection of suitable material for connecting rod. Also discuss the method of manufacturing.
6. Write various design steps for designing a bolted joint.

## SECTION-C

7. Determine the diameter for a hollow shaft having inside diameter 0.6 times outside diameter. The maximum allowable shear stress for the shaft is 60MPa. The shaft is driven by a 900 mm diameter overhang pulley placed vertically below it. The weight of the pulley is 600 N. The tension on the tight and slack side of the belt is 2900 N and 1000 N respectively. The overhand is 250 mm. Assume angle of lap of the belt on the pulley to be  $180^\circ$ .
8. A concentric spring consists of two helical compression spring having the same free length. The composite spring is subjected to a maximum force of 2000N. The wire and mean coil diameter of the outer spring are 10 and 80 mm respectively. The numbers of active coils in inner and outer springs with  $G = 81370 \text{ N/mm}^2$ .

Calculate:

- a) Force transmitted by each spring.
  - b) Maximum deflection of the spring and
  - c) Maximum torsional shear stress induced in each spring.
9. Discuss the design considerations for welded joints under various loading conditions in torsion and shear loads.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**