

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER– VII EXAMINATION – SUMMER 2026****Subject Code:3170202****Date:01-06-2026****Subject Name: Automotive Component and system Design****Time:02:30 PM TO 05:30 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1**
- | | | |
|-----|---|-----------|
| (a) | What do you mean by standardization? Describe its significance. | 03 |
| (b) | Explain the concept of preferred numbers and series in design. | 04 |
| (c) | State and explain design consideration of casting. | 07 |

- Q.2**
- | | | |
|-----|---|-----------|
| (a) | Give the advantages and disadvantages of rolling contact bearing over sliding contact bearing | 03 |
| (b) | What is preloading of rolling contact bearing? Why it is necessary | 04 |
| (c) | Derive Stribeck's equation. | 07 |

OR

- (c) Write down the steps for selection of bearing from manufacturer's catalogue. **07**
- Q.3**
- | | | |
|-----|--|-----------|
| (a) | State different modes of gear teeth failures | 03 |
| (b) | Why involute profile is preferred for gear teeth? | 04 |
| (c) | A shaft rotating at constant speed is subjected to variable load. The bearings supporting the shaft are subjected to stationary equivalent radial load of 3 kN for 10 percent of time, 2 kN for 20 per cent of time, 1 kN for 30 percent of time and no load for remaining time of cycle. If the total life expected for the bearing is 20×10^6 revolutions at 95 percent reliability, calculate dynamic load rating of the ball bearing. | 07 |

OR

- Q.3**
- | | | |
|-----|---|-----------|
| (a) | Define the following terms: (i) Pressure Angle (ii) Diametral Pitch (iii) Backlash | 03 |
| (b) | Write a short note on materials selection for gears. | 04 |
| (c) | The following particulars of a single reduction spur gear are given:
Gear Ratio= 10:1 ; Distance between centers=660 mm approximately;
Pinion transmit 500 kW at 1800 r.p.m.; Involute teeth of standard proportions(addendum=m)with pressure angle of 22.5° ; Permissible normal pressure between teeth =175 N per mm of width .find
1. The nearest standard module if no interference is to occur;
2. The number of teeth on each wheel;
3. The necessary width of the pinion ; and
4. The load on the bearing of the wheels due to power transmitted. | 07 |

- Q.4**
- | | | |
|-----|---|-----------|
| (a) | Explain brake efficiency | 03 |
| (b) | What is tractive effort? Explain it. | 04 |
| (c) | Explain with neat sketch the telescopic type suspension system. | 07 |

OR

- Q.4**
- | | | |
|-----|---|-----------|
| (a) | Give the detailed classification of the gearboxes | 03 |
|-----|---|-----------|

- (b) Why the wheel alignment is required in vehicle? Explain the front wheel alignment in vehicle. **04**
- (c) Explain with neat sketch Power Steering of Today's automobile. **07**
- Q.5** (a) What are the advantages and disadvantages of wet liner and Dry liner in I C Engines? **03**
- (b) Why I section is more preferred for connecting rod? **04**
- (c) Four stroke diesel engine has the following specifications: **07**
 Brake power = 5 kW; Speed = 1200 r.p.m.; Indicated mean effective pressure = 0.35 N / mm^2 Mechanical efficiency = 80 %.
 Determine:
 1. bore and length of the cylinder;
 2. thickness of the cylinder head ;
 3. Size of studs for the cylinder head.
 (Any other data required for the design may be assumed.)
- OR**
- Q.5** (a) What is the function of connecting rod of an internal combustion engine? **03**
- (b) State the function of following for an I C Engine piston: **04**
 1. Piston rings, 2. Piston skirts, 3. Piston pin, 4. Ribs
- (c) Discuss the design of piston for an internal combustion engine. **07**
