

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018 - 19 Examination

Semester: 6**Subject Code: 03102352****Subject Name: Automobile Component Design****Date: 11/05/2019****Time: 10:30am to 01:00pm****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (All are compulsory) (Each of one mark) (15)

1. The side thrust on the cylinder liner is usually taken as..... of the maximum gas load on the Piston.
(a) 1/5 (b) 1/8 (c) 1/10 (d) 1/5
2. The rocker arm is used to actuate the inlet and exhaust valves motion as directed by the
(a) cam and follower (b) crank (c) crankshaft (d) none of these
3. The design of piston head is based on,
(a) strength and rigidity considerations (b) bending and torsional moments
(c) buckling consideration (d) strength and heat transfer considerations
4. The rolling contact bearing are known as
(a) thick lubricated bearings (b) Plastic bearings
(c) thin lubricated bearings (d) antifriction bearings
5. When the length of the journal is equal to the diameter of the journal, then the bearing is said to be a
(a) short bearing (b) long bearing (c) medium bearing (d) square bearing
6. In thrust bearings, the load acts
(a) along the axis of rotation (b) parallel to the axis of rotation
(c) perpendicular to the axis of rotation (d) in any direction
7. The size of gear is usually specified by
(a) pressure angle (b) pitch circle diameter (c) circular pitch (d) diametral pitch
8. When the axes of two shafts are perpendicular and intersecting, use
(a) spur gears (b) bevel gears (c) worm gears (d) helical gears
9. What is mean by Hydrodynamic lubrication?
10. Derive the value of series factor of basic series R10.
11. At what angle of the crank, the twisting moment is maximum in the crankshaft?
12. Why the area of inlet valve is made larger than area of exhaust valve?
13. Why I section is more preferred for connecting rod?
14. What do you mean by standardization?
15. What is herringbone gear? Where they are used?

Q.2 Answer the following questions. (Attempt any three) (15)

- A) Explain the working of valve gear mechanism for a given I.C. engine with neat sketch.
- B) Give the detailed classification of gearboxes with suitable example.
- C) Explain the design considerations for Casting.
- D) Explain the following terms as applied to journal bearing:
a) Bearing characteristic number b) Bearing Modulus

Q.3 A) Explain with neat sketch, the design procedure for the Piston for an I.C. engine. (07)

- B) A four stroke internal combustion engine has the following specifications: (08)**

Brake power = 7.5 kW; Speed = 1000 r.p.m.; Indicated mean effective pressure = 0.35 N/mm^2 Maximum gas pressure = 3.5 N/mm^2 ; Mechanical efficiency = 80 %.

Determine: 1. The dimensions of the cylinder, if the length of stroke is 1.4 times the bore of the cylinder;

2. Wall thickness of the cylinder, if the hoop stress is 35 MPa; Reboring allowance $C=4$
3. Thickness of the cylinder head and the size of studs when the permissible stresses for the Cylinder head and stud materials are 45 MPa and 65 MPa respectively.

OR

- B) Determine the dimensions of cross section of connecting rod for a diesel engine with data (08)
 cylinder bore = 100mm, length of connecting rod = 320mm, maximum gas pressure = 2.45Mpa, factor of safety against buckling failure = 5 , material of connecting rod is steel, constant 'a' for steel material is 1/7500, $\sigma_c=330\text{N/mm}^2$ also determine variation of height. Assume necessary data if required.

- Q.4** A) A pair of 20° full-depth involute tooth spur gears is to transmit 30 kW at a speed of 250 (07)
 r.p.m. of the pinion. The velocity ratio is 1 : 4. The pinion is made of cast steel having an allowable static stress, $s = 100$ MPa, while the gear is made of cast iron having allowable static stress, $s = 55$ MPa. The pinion has 20 teeth and its face width is 12.5 times the module. Determine the module, face width and pitch diameters of both the pinion and gear from the standpoint of strength only taking velocity factor into consideration. The tooth form factor is given by the expression and velocity factor is given by
 $y = 0.154 - (0.912/\text{No. of teeth})$
 $C_v = 3/3 + v$, where v is the peripheral speed of the gear in m/s

OR

- A) A full journal bearing of 50 mm diameter and 100 mm long has a bearing pressure of 1.4 (07)
 N/mm^2 . The speed of the journal is 900 r.p.m. and the ratio of journal diameter to the diametral clearance is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75°C may be taken as 0.011 kg/m-s. The room temperature is 35°C . Find: 1. The amount of artificial cooling required and 2. The mass of the lubricating oil required, if the difference between the outlet and inlet temperature of the oil is 10°C . Take specific heat of the oil as $1850 \text{ J / kg / }^\circ\text{C}$ and heat dissipation coefficient $C=280 \text{ W/m}^2 \text{ }^\circ\text{C}$.
- B) Write the expressions for beam strength, static, limiting wear load and dynamic load for spur (08)
 Gears and explain the various terms used in equation.