Auto

BE/SemVII/CBSGS/AUTO/AD/MJ-18

23/05/18

Q. P. Code: 39100

(3 Hours)

N.B. 1) **Question No. 1 is compulsory**
2) Solve **Any Three** from remaining **Five** questions.
3) Use of standard data book is permitted
4) Assume suitable data if necessary, giving justification

Q1	Answer any **Four** from the following	
a)	Suggest suitable materials for the following parts stating the special property which makes it more suitable for use in manufacturing: 1. Diesel engine crankshaft 2. Automobile tyres 3. Roller bearings	5
b)	Why the area of the inlet valve port is made larger than the area of exhaust valve port?	5
c)	What are the desirable properties of cylinder materials? Name the material used for engine cylinder.	5
d)	Explain characteristics of brake lining material.	5
e)	What are the different materials used in advanced automotive body structures	5
Q2	A four stroke internal combustion engine has the following specifications: Brake power = 7 KW; Speed = 1000 r.p.m.; Indicated mean effective pressure = 0.35 N/mm^2; Maximum gas pressure = 3.9 N/mm^2; Mechanical efficiency = 85 %. **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 3. Thickness of the cylinder head and the size of studs when the permissible stresses for the cylinder head and stud materials are 55 MPa and 85 MPa respectively.	20
Q3 a)	The following particulars refer to a four stroke cycle diesel engine: Cylinder bore = 140 mm; Stroke = 187.5 mm; R.P.M. = 1000; Maximum gas pressure = 5.5 N/mm^2; Mass of reciprocating parts = 2 kg. 1. The dimensions of an *I*-section connecting rod with an elastic limit compressive stress of 350 MPa. The ratio of the length of connecting rod to the length of crank is 4 and the factor of safety may be taken as 5 2. The wrist pin and crankpin dimensions on the basis of bearing pressures of 10 N/mm^2 and 6.5 N/mm^2 of the projected area respectively and 3. The dimensions of the small and big ends of the connecting rods, including the size of the securing bolts of the crankpin end. Assume that the allowable stress in the bolts, is not to exceed 45 N/mm^2. Draw dimensioned sketches of the connecting rod showing the provisions for lubrication.	15
Q3 b)	Discuss the design considerations of crankshaft for an internal combustion engine.	05

Q4 Design a rocker arm of *I*-section made of cast steel for operating an exhaust valve of a gas engine. The effective length of the rocker arm is 200 mm and the angle between the arm is 135°. The exhaust valve is 85 mm in diameter and the gas pressure when the valve begins to open is 0.4 N/mm^2. The greatest suction pressure is 0.03 N/mm^2 below atmospheric. The initial load may be assumed as 0.05 N/mm^2 of valve area and the valve inertia and friction losses as 120 N. The ultimate strength of cast steel is 750 MPa. The allowable bearing pressure is 8 N/mm^2 and the permissible stress in the material is 75 MPa. **20**

Q5 a) A multiple disc clutch has three discs on the driving shaft and two on the driven shaft, providing four pairs of contact surfaces. The outer diameter of the contact surfaces is 250 mm and the inner diameter is 150 mm. Determine the maximum axial intensity of pressure between the discs for transmitting 18.75 kW at 500 r.p.m. Assume uniform wear and coefficient of friction as 0.3. **15**

Q5 b) Explain the Design Consideration of Propeller Shaft **05**

Q6 a) Design a propeller shaft for an automobile engine developing 30 HP at 1500 rpm. The bottom gear ratio being 3.2 and ratio of external diameter of propeller shaft and its internal diameter is 1.8. Assume a safe shear stress of 50 MPa for the material of shaft. Any other data required can be assumed. **10**

Q6 b) An automotive type internal expanding double shoe brake is shown in following figure 1.The face width of the friction lining is 40mm and the maximum intensity of normal pressure is limited to 1 N/mm^2. The coefficient of friction is 0.32. The angle Θ_1 can be assumed to be zero. Calculate **10**

i)The actuating force P; and

ii) The torque absorbing capacity of the brake.

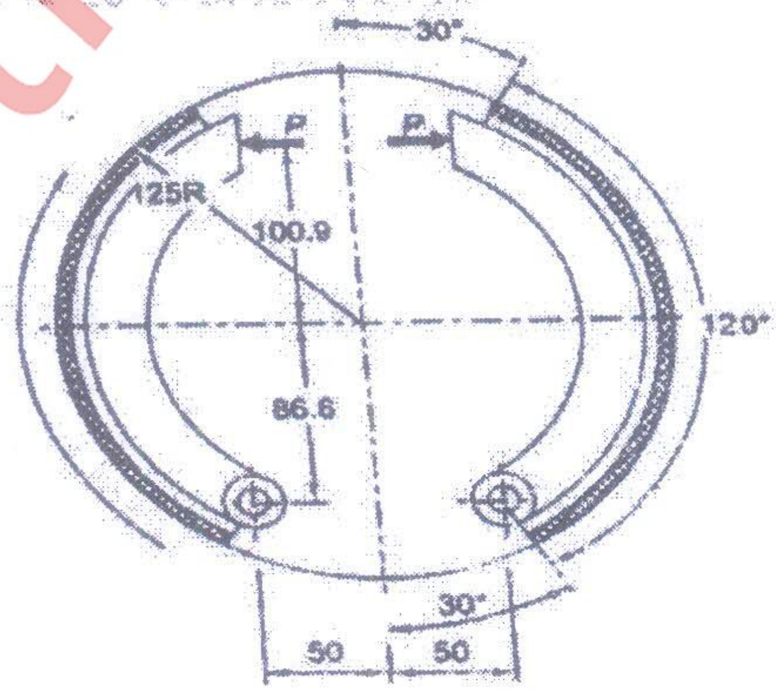

Figure 1

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