G 654 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Mechanical Engineering

MACHINE DESIGN AND DRAWING—I (M)

(Old Scheme—Prior to 2010 Admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Suitably assume any missing data.
Answer any **two** *question from Part* A *and* **two** *from Part* B.
Each question carries 25 *marks.*

Part A

1. Design a knuckle joint to connect two tension rods subjected to an axial load of 15 kN. Take $\sigma_t = 65$ MPa, $\sigma_c = 80$ MPa and $\tau = 50$ MPa.

2. A marine type flange coupling is required to transmit 2900 kW power at a speed of 100 rev/min Flanger are connected by 8 taper bolts having an allowable shear stress of 60 N/mm^2. The material of shaft and bolts used is same. Design the flange coupling and determine the shaft diameter.

3. Enumerate the factor and properties, of material a designer is required to consider while designing a machine part.

4. A boiler drum of internal diameter 1.5 m is to be designed to sustain internal pressure of 2N/mm^2. Design longitudinal and Circumferential joint for the material $\sigma_t = 420$ MPa, $\sigma_c = 640$ MPa and $\tau = 330$ MPa.

(2 × 25 = 50 marks)

Part B

5. A solid circular bar of 100 mm diameter and 300 mm length is welded to structural member by a fillet weld all around the bar. A vertical load of 16 kN is acting at the end of the bar. The permissible shear stress in the weld is 90N/mm^2. Determine the leg dimension of the fillet weld.

6. A loaded narrow gauge car weighing 16 kN and moving at a velocity of 1.2 m/s brought to rest by a bumper consisting of two helical steel springs of square section. The mean coil diameter of the springs is six times the side of the square. In bringing the car to rest the springs are compressed by 200 mm. The permissible shear stress is not to exceed 400 N/mm^2. Find the (a) Maximum load on each spring. (b) Side of square section of wire. (c) Mean diameter of coils. (d) Number of active coils. Take G = 84 kN/mm^2.

7. Design a C-I flywheel for a four stroke engine developing 150 kW at 200 r.p.m. Calculate the mean diameter of the flywheel if the hoop stress is not to exceed 4 MPa. Total fluctuation of speed is to be 4% of the mean speed. Workdone during the power stroke may be assumed to be 1.5 times the average work done during the cycle. Density of C.I. is 7200 kg/m^3.

8. Design a C.I. piston for a single acting four stroke engine for the following specification

Cylinder bore	=	100 mm
Stroke	=	120 mm
Maximum gas pressure	=	5N/mm^2.
Brake mean effective pressure	=	0.65 N/mm^2.
Fuel consumption	=	0.227 kg/kW/hr.
Speed	=	2200 rev/min.

Assume suitable data.

(2 × 25 = 50 marks)