

1341**Code : 15ME53T**Register
Number

--	--	--	--	--	--	--

V Semester Diploma Examination, April/May-2018**MACHINE DESIGN****Time : 3 Hours]****[Max. Marks : 100**

- Note :**
- (i) Answer **all** questions
 - (ii) Use of design data hand book permitted.
 - (iii) Assume missing data suitably.

BETA CONSOLE!

Diploma - [All Branches]

Beta Console Education

**PART – A**

1. List the various factors to be considered in deciding the factor of safety. **5**
2. Discuss the scope of ergonomics in product design. **5**
3. Identify the meaning of different colours as per Morgan's code. **5**

Diploma Question Papers [2015-19]

Beta Console Education

**PART – B**

4. (a) Explain the necessity of riveted joint. **5**
- (b) Two plates 16 mm thick are joined by a double riveted lap joint. The pitch of each row of rivet is 90 mm. The rivets are 25 mm in diameter. The permissible stresses are as follows :
 $\sigma_t = 140 \text{ MPa}$; $\tau = 110 \text{ MPa}$; $\sigma_c = 240 \text{ MPa}$.
Find the efficiency of the joint. **15**

OR

- (a) Differentiate between Bolt, Stud and Nut. **5**
- (b) A steam engine cylinder has an effective diameter of 350 mm and the maximum steam pressure acting on the cylinder cover is 1.25 N/mm^2 . Calculate the number and size of studs required to fix the cylinder cover, assuming the permissible stress in the studs as 33 MPa. **15**

5. (a) State the properties of materials used for shafts. 5
- (b) Find the diameter of solid shaft to transmit 20 kW at 240 rpm. The ultimate shear stress for the steel may be taken as 360 MPa and factor of safety as 8. If a hollow shaft is to be used in place of solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5. 15

OR

- (a) Explain the effect of keyway cut into the shaft. 5
- (b) A shaft made of mild steel is required to transmit 100 kW at 300 rpm. The supported length of the shaft is 3 m. It carries two pulleys each weighing 1500 N supported at a distance of 1 m from the ends respectively. Assuming the safe value of stress as 60 MPa and allowable tensile stress not to exceed 100 MPa. Determine the dia of the shaft. 15
6. (a) Explain the significance of Wahl's factor. 5
- (b) Design a helical spring for a maximum load of 1000 N for a deflection of 25 mm using the value of spring index as 5. The maximum permissible shear stress for spring wire is 420 MPa and modulus of rigidity is 84 kN/mm² with considering Wahl's factor. 15

OR

- (a) Explain the construction of leaf spring. 5
- (b) Design a valve spring of a petrol engine for the following operating conditions :
Spring load when the valve is open = 400 N
Spring load when the valve is closed = 250 N
maximum inside dia of spring = 25 mm
length of spring when the valve is open = 40 mm
length of spring when the valve is closed = 50 mm
maximum permissible shear stress = 400 MPa. 15

PART - C

7. Design a cast iron flange coupling for a MS shaft transmitting 90 kW at 250 rpm. The allowable shear stress in the shaft is 40 MPa and the angle of twist is not to exceed 1° in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 MPa. 25