MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **IV (New)**	**Term**	: **II**	**Academic Year**	: **2018-19**
Course No.	: FMPE 247	**Title**	: **Machine Design**		
Credits	: 2 (1+1)				
Day & Date	: Tuesday, 07.05.2019	**Time**	: 14.00 to 16.00	**Total Marks**	: **40**

Note : 1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 Explain any eight mechanical properties of metals.

Q.2 a) A plate 100 mm wide and 10 mm thick is to be welded to another plate by means of double parallel fillet welds. The plates are subjected to a static load of 80 kN. Find the length of the welds if the permissible shear stress in the weld does not exceed 55MPa.

b) What are types of levers and give its applications?

Q.3 a) What is welded joint? Explain in brief about welding processes.

b) Give expression for length of chain and centre distance of chain drive.

Q.4 Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 MPa in tension, 60 MPa in shear and 150 MPa in compression.

Q.5 a) How the shaft is designed when it is subjected to twisting moments only?

b) A compression coil spring made of an alloy steel is having the following specifications: Mean diameter of coil = 50 mm; Wire diameter = 5 mm; Number of active coils = 20.

If this spring is subjected to an axial load of 500 N; calculate the maximum shear stress (neglecting the curvature effect) to which the spring material is subjected.

Q.6 Design a clamp coupling to transmit 30 kW at 100 rpm. The allowable shear stress for the shaft and key is 40 MPa and the number of bolts connecting the two halves are six. The permissible tensile stress for the bolts is 70 MPa. The coefficient of friction between the muff and the shaft surface may be taken as 0.3.

Q.7 Describe the velocity ratio of belt drive and slip of belt with and without consideration of belt thickness.

Q.8 Explain the design procedure for a hand levers with neat sketch.

(P.T.O.)

Q.9 a) Derive the relation for the ratio of driving tension of V belt.

b) Sketch the different types of keys and explain them in brief.

Q.10 A 15 kW, 960 r.p.m. motor has a mild steel shaft of 40mm diameter and the extension being 75 mm. The permissible shear and crushing stresses for the mild steel key are 56 MPa and 112 MPa. Design the keyway in the motor shaft extension. Check the shear strength of the key against the normal strength of the shaft.

SECTION "B"

Q.11 Fill in the blanks.

1) The electric arc welding is type of _____ welding.

2) The failure caused by repeated stresses is called _____failure.

3) Included angle for V-belt is usually from _____ to _____deg.

4) Muff couplings are _____ type coupling.

Q.12 Define the following terms.

1) Resilience
2) Spring index
3) Rational design
4) Pitch of chain

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