

Roll No



**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
MID TERM EXAMINATION - NOV 2023**

**Semester :** Semester V - 2021

**Course Code :** MEC3090

**Course Name :** Sem V - MEC3090 - Design of Machine Elements-I

**Program :** B. TECH

**Date :** 2-NOV-2023

**Time :** 2:00PM - 3:30PM

**Max Marks :** 50

**Weightage :** 25%

**Instructions:**

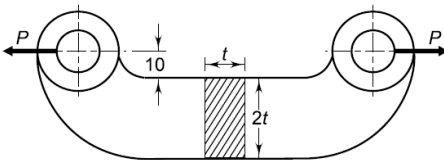
- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 2 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

**PART A**

**DESCRIPTIVE**

**10 MARKS EACH QUESTION**

1. An offset link subjected to a force of 25 kN is shown in Fig. It is made of grey cast iron FG300 and the factor of safety is 3. Calculate the dimensions of the cross-section of the link.



(CO1) [Application]

2. A Ground steel bar, 50 mm in diameter, is subjected to a reversed bending stress of  $250 \text{ N/mm}^2$ . The bar is made of steel 40C8 ( $\sigma_u = 520 \text{ N/mm}^2$ ). Calculate the life of the bar for a reliability of 90%. is subjected to a completely reversed axial load of 150 kN.

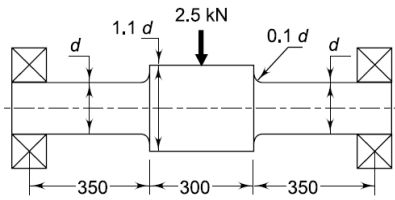
(CO2) [Application]

PART B

DESCRIPTIVE

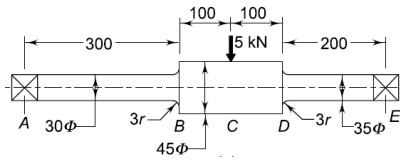
15 MARKS EACH

3. A non-rotating shaft supporting a load of 2.5 kN is shown in Fig. The shaft is made of brittle material, with an ultimate tensile strength of  $300 \text{ N/mm}^2$ . The factor of safety is 3. Calculate the dimensions of the shaft.



(CO1) [Application]

4. A rotating shaft, subjected to a non rotating force of 5 kN and simply supported between two bearings A and E is shown in Fig. The shaft is finished in a grinding machine from plain carbon steel 30C8 ( $\sigma_{ut} = 500 \text{ N/mm}^2$ ) and the expected reliability is 99%. The equivalent notch radius at the fillet section can be taken as 3 mm. The working temperature of shaft is around 460 degree celcius. Identify the life of the shaft?



(CO2) [Application]