

B.TECH SEM - III (2007 COURSE) MECHANICAL ENGG./
PRODUCTION ENGG. : SUMMER - 2018
SUBJECT: STRENGTH OF MACHINE ELEMENTS (C)

Day : **Monday**
Date : **21/05/2018**

S-2018-2584

Time : **02.30 PM TO 05.30 PM**
Max. Marks: 80

N. B.:

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of remaining attempt **ANY TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answer to both the section should be written in **SEPARATE** answer book.
- 4) Assume suitable data if, necessary.
- 5) Use non-programmable **CALCULATOR** is allowed.

SETION-I

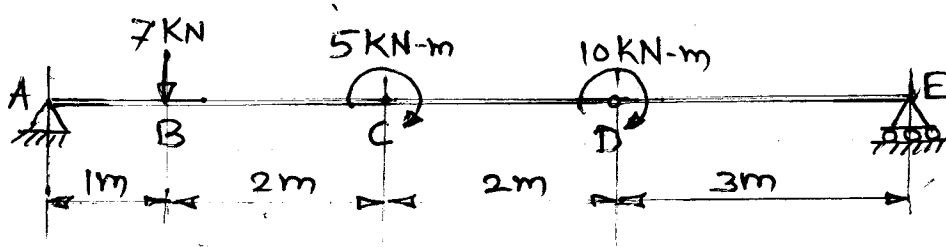
- Q.1 a)** Derive an expression between modulus of elasticity modulus of rigidity. **(05)**
- b)** Write the important applications of following plain carbon steel. **(05)**
i) 30C8 ii) 7C4 iii) 65C6 iv) 50C4.
- c)** The tensile stresses at a point across two mutually perpendicular planes are 120 N/mm^2 and 60 N/mm^2 . Determine the normal, tangential and resultant stresses on a plain inclined at 30° to the axis of the miner stresses. **(04)**
- Q.2 a)** A steel rod 5 m long and 30 mm in diameter is subjected to an axial tensile load of 50 KN. Determine the change in length, diameter, and volume of the rod. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and poisons ratio = 0.25. **(09)**
- b)** Explain the three stages of creep curve. **(04)**
- Q.3** The stresses at a point in a body are $\sigma_x = 95 \text{ MPa}$, $\sigma_y = 20 \text{ MPa}$ and $\tau_{xy} = 80 \text{ MPa}$. Material has yield point stress of 300 MPa, find the factor of safety by:
i) Maximum shear stress theory ii) Mises Hencky theory. **(13)**
- Q.4** A bar of steel is 60 mm x 60 mm in section and 180 mm long. It is subjected to a tensile load of 300 KN along the longitudinal axis and tensile loads of 750 KN and 600 KN on the lateral surfaces. Find the change in the dimensions of the bar and the change in the volume. Take $E = 200 \text{ GN/m}^2$ $\mu = 0.3$. **(13)**

SETION-II

- Q.5 a)** Explain with sketch failure of cotter in bending in cotter joint. **(05)**
- b)** Derive the relation between slope, deflection and radius of curvature of simply supported beam. **(05)**
- c)** Explain with neat sketch of the bolt of uniform strength. **(04)**
- Q.6** Design a knuckle joint for a tie rod of circular section to sustain a maximum pull of 70 KN. The ultimate tensile strength of the material of the rod against tearing is 420 N/mm^2 . The ultimate tensile and shearing strength of the pin material are 510 N/mm^2 and 396 N/mm^2 respectively. Determine the tie rod section and pin section. Take factor of safety = 6. **(13)**

P.T.O.

Q.7 Draw Shear force and Bending moment diagram for the beam shown in figure. (13)



Q.8 A steel plate subjected to a force of 50 kN and fixed to a channel by means of five identical bolts as shown in fig. The bolts are made from plain carbon steel 45C8 ($S_{yt} = 380 \text{ MPa}$) and the factor of safety is 3. Specify the size of the bolts. (13)

