Total No. of printed pages = 7

END SEMESTER EXAMINATION, NOVEMBER-2018

Semester : 3rd (diploma)

Subject Code : CT-303

STRENGTH OF MATERIALS

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. *All* questions of PART – A are compulsory.
2. Answer *all* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : 1×10=10

   (a) The dimension of strain is given by _____.

   (b) The property by which a body returns to its original shape after removal of the force, is called _____.

[Turn over

(c) Eccentrically loaded structures have to be designed for _____.

(d) Mild steel exhibits _____ mechanical property of material.

(e) At hinge, the moments will be _____.

(f) The rate of change of _____ is equal to intensity of loading.

(g) A cantilever beam subjected to point load at its free end, the maximum bending moment develops at the _____ of beam.

(h) Positive bending moment is known as _____ moment.

(i) _____ support develops support moment.

(j) Moving train is an example of _____ load.

2. Write true or false : 1×10=10

(a) The ratio of original length to the change in length is called strain.

(b) Light year is not a unit of distance.

(c) Linear strain is always accompanied by lateral strain.

(d) The materials which have the same elastic properties in all directions, are called isotropic.

(e) If the type of loading in simply supported beam is U.D.L, then variation in the SFD will be linear.

(f) When SF is zero, the bending moment is minimum.

(g) The maximum bending moment for a simply supported beam loaded with W kN point load at the mid span of the beam is given by $WL^2/8$.

(h) Ratio of lateral strain by linear strain is also represented by Poisson's ratio. 1

(i) If force is applied in the direction of length, then the strain in the direction of length is also called as secondary or lateral strain.

(j) If SFD line is linear, then BMD line will be parabolic curve.

3. Choose the correct answer : 1×5=5

(a) Some structural members subjected to long time sustained loads deform progressively with time especially at elevated temperatures. What is such a phenomenon called ?

(i) Fatigue (ii) Creep

(iii) Creep relaxation (iv) Fracture

(b) The property of a material by which it can be beaten or rolled into thin plates, is called

(i) Malleability (ii) Plasticity

(iii) Ductility (iv) Elasticity

(c) The body will regain its previous shape and size only when the deformation caused by the external forces, is within a certain limit. What is that limit ?

(i) Plastic limit

(ii) Elastic limit

(iii) Deformation limit

(iv) None of the above

(d) The shear force in a beam subjected to pure positive bending is

(i) Positive (ii) Negative

(iii) Zero (iv) Can't determine

(e) In SFD, vertical lines are for

(i) Point load (ii) UDL

(iii) UVL (iv) None of the above.

PART – B

Marks – 45

4. (a) In an experiment, a steel specimen of 13 mm diameter was found to elongate 0.2 mm in a 200 mm gauge length when it was subjected to a tensile force of 26.8 kN. If the specimen was tested within the elastic range, what is the value of Young's modulus for the steel specimen ? 5

(b) A load of 5 kN is to be raised with the help of a steel wire. Find the minimum diameter of the steel wire, if the stress is not to exceed 100 Mpa. 4

5. (a) A simply supported beam AB of span 2.5m is carrying two point loads as shown in fig. 13.13. Draw the SFD and BMD for the beam. Show all the calculations. 6

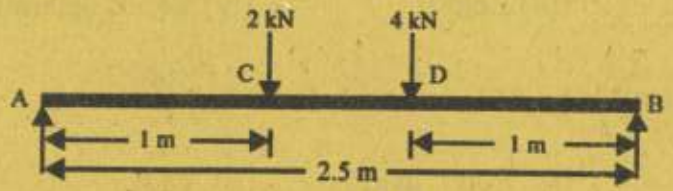

Fig.13.13

(b) List out the rules followed for drawing SFD and BMD for a given loading system on a beam. 3

6. In an experiment, a bar of 40 mm diameter is subjected at a pull of 70 kN. The measured extension on gauge length of 300 mm is 0.10 mm and the change in diameter is 0.0042 mm. Calculate the Poisson's ratio and the values of the three moduli. 9

7. A simply supported beam AB, 6m long is loaded as shown in fig.13.21. Construct the shear force and bending moment diagrams for the beam and

find the position and value of maximum bending moment. Show all the calculations. 9

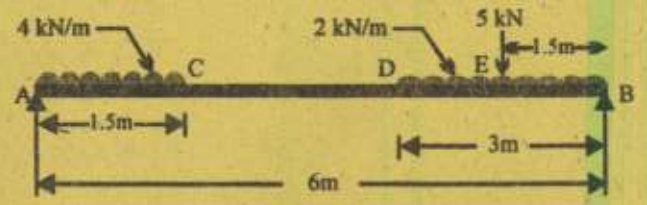

Fig.13.21

8. The stresses at a point in a component are 100 Mpa and 50 Mpa, both tensile. Determine the magnitude of the normal and shear stresses on a plane inclined at an angle of 25° with the tensile stress. Also determine the direction of the resultant stress and the magnitude of the maximum intensity of shear stress. 9