USN | | | | | | | | | | |

15ENG2.5

Second Semester B.Arch. Degree Examination, June/July 2016
Building Structures – II

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least ONE questions from each module.***

Module – 1

1 a. Define centre of gravity and centroid. **(04 Marks)**

b. Determine the location of the centroid shown in Fig. Q1 (b). **(16 Marks)**

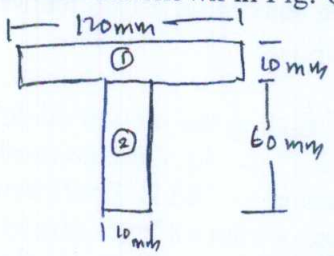

Fig. Q1 (b)

2 a. State parallel axis theorem and explain in brief. **(04 Marks)**

b. Determine the centroid of the Fig. Q2 (b). **(16 Marks)**

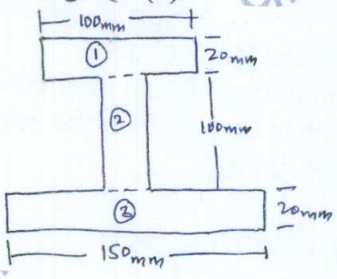

Fig. Q2 (b)

Module – 2

3 a. Find the support reactions for the beam shown in Fig. Q3 (a). **(10 Marks)**

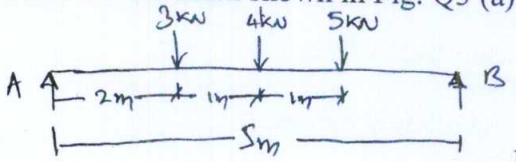

Fig. Q3 (a)

b. Find the support reactions shown in Fig. Q3 (b). **(10 Marks)**

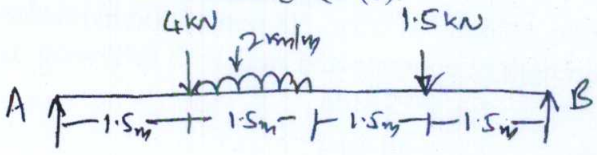

Fig. Q3 (b)

4 a. Draw SFD and BMD for the beam shown in Fig. Q4 (a). **(10 Marks)**

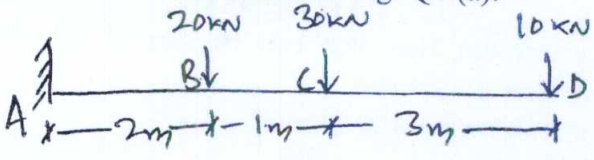

Fig. Q5 (a)

b. Draw SFD and BMD for the beam shown in Fig. Q4 (b). **(10 Marks)**

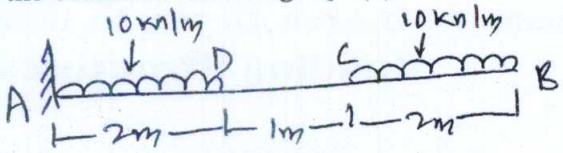

Fig. Q5 (b)

Module – 3

5 a. List out the assumptions made in theory of simple bending. **(04 Marks)**

b. A steel plate is bent in to circular arc of radius 10 m. If the plate section be 120 mm wide and 20 mm thick, find the maximum stress induced and the BM, which can produce this stress. Take $E = 2\times10^5$ N/mm^2. **(16 Marks)**

6 a. Provide the expression for finding the section modulus for,
i) Rectangular section ii) Circular section
iii) Hollow rectangular section iv) Hollow circular section. **(04 Marks)**

b. A rectangular beam of size $40\text{mm}\times80\text{mm}$ simply supported on a span of 1.20 m carries a point load of 1500 N at its centre. Find the flexural rigidity and maximum deflection. $E = 108\times10^3$ N/mm^2. **(16 Marks)**

Module – 4

7 a. Differentiate between short and long columns. **(04 Marks)**

b. A hollow mild steel tube 6 m long 40 mm internal diameter and 50 mm external diameter is used as a shunt with both ends hinged. Find the crippling load and safe load taking factor of safety as 3.0 and $E = 2\times10^5$ N/mm^2. **(16 Marks)**

8 a. Define : i) strut ii) Slenderness ratio iii) Buckling lond
iv) safe load **(04 Marks)**

b. A solid rand bar 3 m long and 50 mm diameter is used as a strut. Determine the crippling load, when the given strut is used with the following conditions: $E = 2\times10^5$ N/mm^2:
i) Both ends hinged.
ii) One end fixed and other is free.
iii) Both ends are fixed.
iv) One end fixed and other is hinged. **(16 Marks)**

Module – 5

9 A square concrete column of size $500\text{mm}\times500\text{mm}$ reinforced with 8 bars of 12 mmϕ. Determine the strength of concrete and steel with following data:
i) $f_y = 250$ MPa $f_{CK} = 15$ MPa
ii) $f_y = 415$ MPa $f_{CK} = 20$ MPa
iii) $f_y = 500$ MPa $f_{CK} = 25$ MPa **(20 Marks)**

10 Calculate the maximum load that can be carried by $400\text{mm}\times400\text{mm}$ square column reinforced with 8 bars of 22 mmϕ.
Use $\sigma_{CC} = 5$ /mm^2 and $\sigma_{SC} = 190$ N/mm^2 **(20 Marks)**

* * * * *