Ref. no.:- EX/CE/314/2019

BE CIVIL ENGINEERING

3rd year-1st semester-2019

Design of Structures I

Time – 3 hour

Full marks – 100

Figures in the margin indicates marks

Part I (60 marks)

IS 456 and SP16 codes are allowed in the examination hall

Assume reasonable values of any data, if required

1(a). Design a simply supported RCC beam of span 6m against a live load of 30 KN/m. Grade of concrete M25 and Grade of steel Fe415. Partial safety factor against load = 1.5. Apply Limit State method of design as per IS456. 10

OR

Design a simply supported RCC beam of span 5m against a live load of 25 KN/m. Grade of concrete M20 and Grade of steel Fe415. Partial safety factor against load = 1.5. Apply Limit State method of design as per IS456. 10

(b) Design a RCC slab panel 4m x 5m (Two adjacent edges discontinuous and two other edges continuous) against a live load of 3.5 KN/m^2 . Grade of concrete M20 and Grade of steel Fe415. Calculate maximum deflection. Partial safety factor against load = 1.5. Apply Limit State method of design as per IS456. Show detail of reinforcement through neat sketches. 25

OR

Design a RCC slab panel 4.5m x 5.85m (Threeedges discontinuous and one longedge continuous) againsta live load of 3 KN/m^2 . Grade of concrete M20 and Grade of steel Fe415. Calculate maximum deflection.Partial safety factor against load = 1.5. Apply Limit State method of design as per IS456.Show detail of reinforcement through neat sketches. 25

2. Design a short square column with a square isolated RCC footing against an axial compressive load of 1400 KN. Grade of concrete M20 and Grade of steel Fe415. Safe capacity of soil = 120 KN/m^2.Partial safety factor against load = 1.5. Apply Limit State method of design as per IS456.Show detail of reinforcement through neat sketches. 25

OR

Design a short square column with a square isolated RCC footing against an axial compressive load of 1600 KN. Grade of concrete M20 and Grade of steel Fe415. Safe capacity of soil = 180 KN/m^2.Partial safety factor against load = 1.5. Apply Limit State method of design as per IS456.Show detail of reinforcement through neat sketches. 25

.....B.E. Civil Engineering 3rd Year 1st Semester..... EXAMINATION, *2019*

SUBJECT *.....Design of Structures - I.....*

(Name in full)

PAPER .....--.....

Full Marks 100
(40 marks for this part)

Time: ~~Two hours~~/**Three hours**/~~Four hours/Six hours~~

Use a separate Answer-Script for each part

No. of Questions	**PART II**	Marks
	(Use of IS:456-2000 and SP:16 are allowed in the examination hall) **Answer Q.1 and ANY ONE questions from the rest**	
1.	Beam A1-B1-C1 of a R.C. framed building is subjected to the loads (Dead & Live) as shown in fig.1. Calculate the bending moment and shear force at the critical sections of the beam by **'substitute frame analysis'** and design the flexural reinforcement and shear reinforcement of **any one span** of the beam. Apply **'Limit state method of design'**. Floor-to-floor height is 3.5m. The cross-sectional dimensions may be assumed as 300mmx450mm for beam and 400mmx400mm for column. The grade of concrete is **M25** and grade of steel is **Fe500**. Show the reinforcement details in neat sketch.	[25]
2.	A dog-legged stair is to be constructed in a multistoreyed building within a clear space of 3.5m x 5.25m. There are four columns having cross-sectional dimension 450mm x 450mm at the four corners of the stair room. The cross-sectional dimension of floor beams and intermediate beams are 300mm x 450mm. Floor to floor height of the building is 3.0m. Intensity of live load is 4.0kN/m^2. Show general arrangement of the stair with detailed dimension for an intermediate floor. Design and detail the first flight of this stair. Grade of concrete is **M20** and grade of steel is **Fe500. Apply 'Limit state method' of design**.	[15]

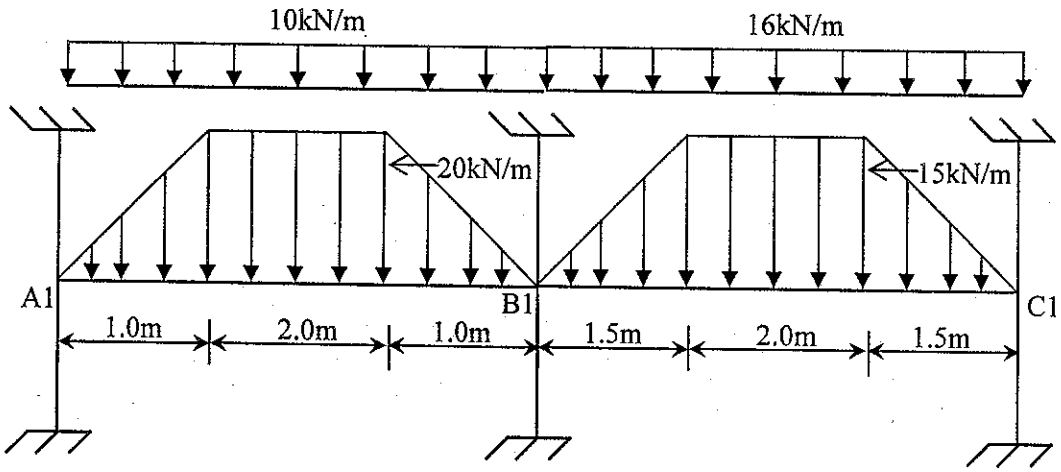

Fig. 1

(Contd. to page 2)

.....*B.E. Civil Engineering 3rd Year 1st Semester*..... EXAMINATION, *2019*

SUBJECT .....*Design of Structures - I*.....
(Name in full)

PAPER .....

Full Marks 100
(40 marks for this part)

Time: ~~Two hours~~/**Three hours**/~~Four hours/Six hours~~

Use a separate Answer-Script for each part

No. of Questions	**PART II**	Marks
	(Contd. from page 1)	
3.	a) The loading on a beam ABCD is shown in the following Fig-2. Calculate the **bending moment** at the critical sections of the beam **using the coefficients** given in IS:456-2000.	[5+3+5 +2 = 15]

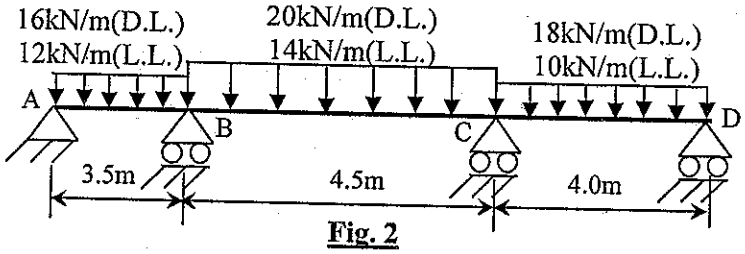

Fig. 2

b) Write the different conditions satisfying which a beam section may be designed as 'flanged beam section'.

c) Derive the expression of the determination of depth of neutral axis and moment of resistance of the 'flanged beam (T-beam) section' in 'working stress method of design'.

d) "The entire span of a continuous beam cannot be designed as a flanged section" – Why?

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