Ex/CE/T/314/2018

Bachelor of Civil Engineering Examination , 2018
(BCE – 3rd year –1st semester)

Design of Structures I

Time: 3 hours

Full marks : 100

The figures in the margin indicate full marks

Part- I (60 marks)

Assume reasonable value of any data if required
IS 456 and SP16 are allowed in the examination hall
Show detail of reinforcements through neat sketches

Answer any two questions

30

1. Design a RCC slab panel of dimension 4m x 4.8m against a live load of 3 KN/m^2. Two adjacent edges of the slab panel is discontinuous and remaining two edges are continuous. Check short and long term deflection. Grade of concrete M20. Grade of steel Fe 415. 'Limit State Method' of design as per IS 456.

20+10=30

2(a) Design a short RCC column against an axial compressive force of P=2500 KN and biaxial moments M_x=225 KN-m and M_y= 125 KN-m. Grade of concrete M25. Grade of steel Fe 415. Apply 'Limit State Method' of design as per IS 456. Partial safety factor against load and moments may be considered 1.5.

(b) Design a simply supported RCC beam of span 5m against an udl of 25 KN/m. Grade of concrete M20.Grade of steel Fe 415. Apply 'Limit State Method' of design as per IS 456. Partial safety factor against load and moments may be considered 1.5.

30

3. Design a short column with a suitable Isolated square footing against an axial compressive force P=1500 KN.Safe bearing capacity of soil =125 KN/m^2. Partial safety factor against load may be considered 1.5.

.....*B.E. Civil Engineering 3rd Year 1st Semester*..... EXAMINATION, *2018*

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

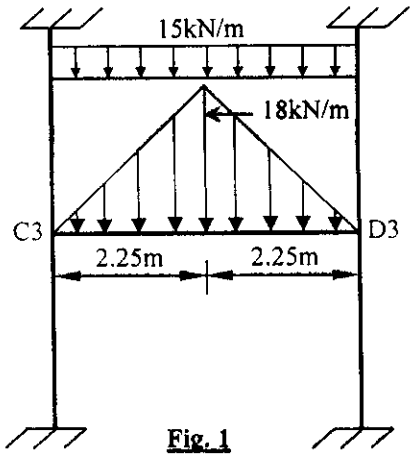
PAPER .....--.....

Full Marks
(40 marks for this pa

Time: **Three hours**

Time:

Use a separate Answer-Script for each part

No. of Questions	**PART II**	No. of Mar Questi
	(Use of IS:456-2000 and SP:16 are allowed in the examination hall) **Answer any ONE from [Q.1 and Q.2] AND any ONE from [Q.3 and Q.4]**	
1.	Beam C3-D3 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'. Design the flexural and shear reinforcement of the beam. Apply '**Limit state method of design**'. Floor-to-floor height is 3.5m. The cross-sectional dimensions may be assumed as 300mmx400mm for beam and 400mmx400mm for column. The grade of concrete is **M25** and grade of steel is **Fe415**. Show the reinforcement details in neat sketch.  **Fig. 1**	[25
2.	A T-beam roof consists of 125mm thick reinforced concrete slab cast monolithically with 300mm wide beams spaced 3.0m centre to centre. The super imposed load over the slab is 4.0kN/m^2 and the effective span of each beam is 6.0m. Design the overall depth, longitudinal reinforcement and shear reinforcement of any intermediate beam. Grade of concrete is **M20** and grade of steel is **Fe415**. Apply '**Working stress method of design**'.	[25]

Contd. to page 2)

18 .....*B.E. Civil Engineering 3rd Year 1st Semester*..... EXAMINATION, *2018*

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

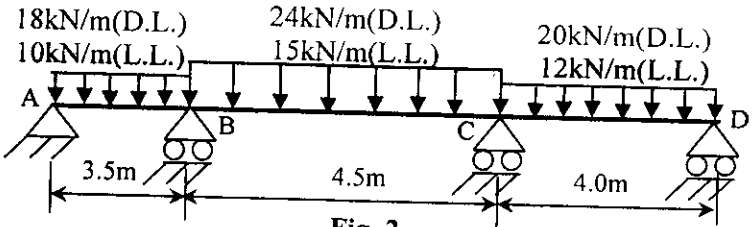
PAPER .....I.....

ull Marks]
for this pa

Time: **Three hours**

Full Marks 100
(40 marks for this part)

Use a separate Answer-Script for each part

Marl	No. of Questions	PART II	Marks
		(Contd. from page 1)	
in by ply ons of [25]	3.	A dog-legged stair is to be constructed in a multistoreyed building within a clear space of 3.0m x 5.25m. There are four columns having cross-sectional dimension 400mm x 400mm 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 **M25** and grade of steel is **Fe415**. **Apply 'Limit state method' of design**.	[15]
	4.	a) The loading on a beam ABCD is shown in the following Fig-2. Calculate the **bending moment** and **shear force** at the critical sections of the beam **using the coefficients** given in IS:456-2000.	[9+3+3 = 15]
		 **Fig. 2**	
		b) Explain the suitability of 'substitute frame method' over the 'conventional moment distribution method'.	
		c) "The entire span of a continuous beam cannot be designed as a flanged section" – Why?	
th is al 20 [25]		=== END ===	
2)			