BE Civil Engineering Examination , 2018
(3rd year –1st semester - Supplementary)

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 SP are allowed in the examination hall
Show detail of reinforcement through neat sketches

Answer any two questions

1(a) Design a short RCC column against an axial compressive force of P=1000 KN and biaxial moments M_x=75 KN-m and M_y= 50 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. Show detail of reinforcements through neat sketches. **20+10=30**

(b) Design a simply supported RCC beam of span 6m against an udl of 20KN/m. Grade of concrete M20.Grade of steel Fe 415. Apply 'Working Stress Method' of design as per IS 456.

2. Design a RCC slab panel of dimension 4mx5m against a live load of 2 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. Apply 'Limit State Method' of design as per IS 456. Show detail of reinforcements through neat sketches. **30**

3. Design a short column with a suitable isolated square footing against an axial compressive force P=1500KN.Safe bearing capacity of soil =120KN/m^2. Partial safety factor against load may be considered 1.5. **30**

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

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

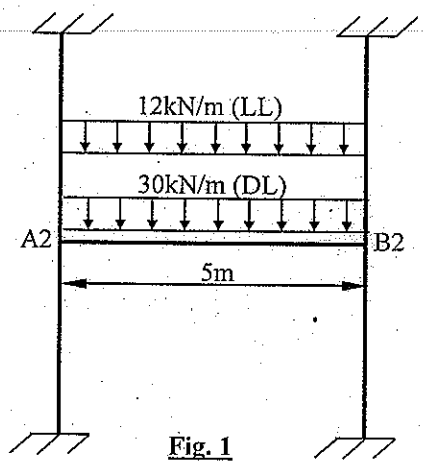
(Name in full)

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

Full Marks 100
(40 marks for this part)

Time: **Three 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 any ONE from [Q.1 and Q.2] AND any ONE from [Q.3 and Q.4]**	
1.	Beam A2-B2 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 3.0m. The cross-sectional dimensions may be assumed as 350mmx500mm for beam and 500mmx500mm 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 115mm thick reinforced concrete slab cast monolithically with 325mm wide beams spaced 2.5m centre to centre. The super imposed load over the slab is 3.0kN/m^2 and the effective span of each beam is 5.5m. 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)

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

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

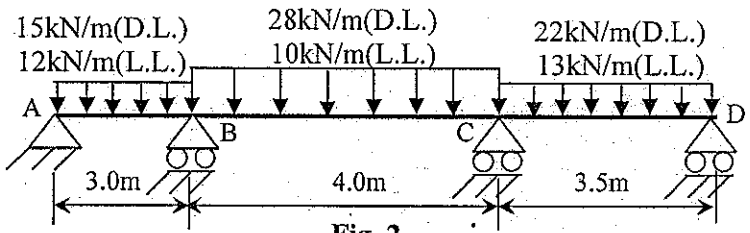
(Name in full)

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

Full Marks 100
(40 marks for this part)

Time: **Three hours**

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
	(*Contd. from page 1*)	
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 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 3.0kN/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 'doubly reinforced beam section' over the 'singly reinforced beam section'.	
	c) "The over reinforced beam section cannot be designed in limit state method of design" – Why?	
	=== END ===	