Form A: Paper –Setting Blank Ref No. –Ex/CE/T/314/2017(S)

B.C.E. 3RD YEAR 1ST SEMESTER 2017
(1st / ~~2nd~~ Semester ~~/ Repeat~~ / **Supplementary** ~~/ Annual / Bianual~~)
SUBJECT: *Design of Structures-I*
(Name in full)

Full Marks 100
Time: ~~Two hours~~/Three hours/~~Four hours/ Six hours~~ (40 marks for part I)
Use a separate Answer-Script for each part

SL	PART – I	Marks
	Assume reasonable data if required. **IS 456 is allowed in the examination hall.** **Answer any TWO (All questions carry equal marks)**	
1.a)	What is effective flange width?	
b)	Find Moment of Resistance of a rectangular beam (250mm x 500mm) with tension reinforcement 3 no. 20 mm dia bars. Material used are M20 concrete and Fe500 steel.	2+8+10 =20
c)	Design a floor slab for an interior room with clear span 2.5m X 6m. The slab is resting on 230mm thick masonry wall. Assume LL=4KN/m^2, DL due to finish, partitions etc. = 1.0KN/m^2. Use M20 concrete and Fe415 steel. Draw detailed labelled diagram.	
2.	Design an isolated footing for the given details: DL=1000KN, LL=600KN, Column size = 300mm X 300mm, Safe bearing capacity of soil = 160KN/m^2.Use M20 concrete and Fe415 steel. Show necessary checks. Also draw PLAN and SECTION of the footing.	20
3.	Design a longitudinally supported Dog-legged stair (Landing supported in the wall) for a building with floor to floor height =3.3. The stair hall measures 2.5m x 5.6m. Use M20 concrete and Fe415 steel. Assume mild exposure. Take Riser = 150mm, Tread = 300mm. Show the detail labelled drawing.	20

.....*B.Civil Engg. 3rd Year 1st Semester [Supplementary]*..... EXAMINATION, *2017*

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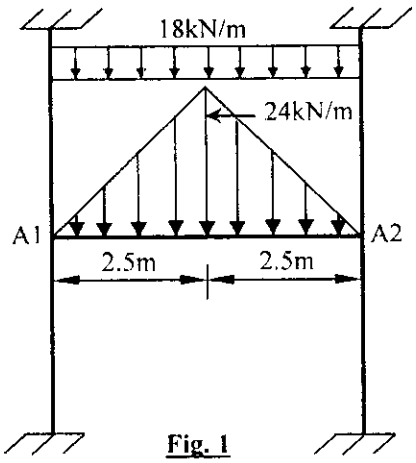
PAPER .....–.....

Full Marks
(60 marks for this

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

Use a separate Answer-Script for each part

No. of Questions	**PART II**	Ma
	(Use of IS:456-2000 and selected part of SP:16 attached herewith are allowed in the examination hall) **Answer Q.1 and ANY TWO questions from the rest**	
1.	Answer the following questions in brief: a) Define 'balanced flexural section' in 'Limit state method' of design. b) Calculate $x_{u(max)}/d$ (x_u is the depth of neutral axis and d is the effective depth of reinforced concrete flexural section) and $p_{t,lim}$ (maximum percentage of tension steel) for M25 grade of concrete and Fe415 grade of steel. c) What is the difference between singly reinforced beam section and doubly reinforced beam section? d) How can the torsional moment be considered while designing the beam against bending moment and shear force as per IS:456-2000?	[2+ +3
2.	Beam A1-A2 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 300mmx450mm 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**	[

(Contd. to page 2)

..... ***B.Civil Engg. 3rd Year 1st Semester [Supplementary]***..... EXAMINATION, *2017*

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

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

Full Marks 100
(60 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) What do you mean by two-way R.C. slab? b) Design a RCC slab panel of dimension 3.0m x 4.5m (effective span lengths). The intensity of live load is 4.0kN/m^2. Consider a super imposed dead load over the slab of intensity 1.0kN/m^2. The slab is continuous along two opposite long edges. Apply '**Limit state method of design**'. The grade of concrete is **M25** and grade of steel is **Fe415**. Show the reinforcement details in neat sketch.	[3+22=25]
4.	Design a short RCC column of rectangular or square cross-section against a factored axial compressive load P = 1500kN and factored biaxial moments M_{XX} = 120kNm and M_{YY} = 90kNm. The main reinforcements are to be distributed along all four sides of the column. Apply '**Limit state method of design**'. The charts of SP:16 attached with this question paper may be used. The grade of concrete is **M20** and grade of steel is **Fe415**. Show the reinforcement details in neat sketch.	[25]

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