(41)

B.E.Civil (Semester-I

Structural Design-III

(2008 Course)

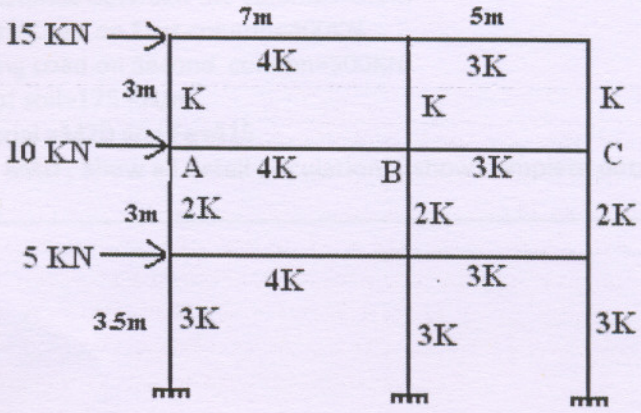
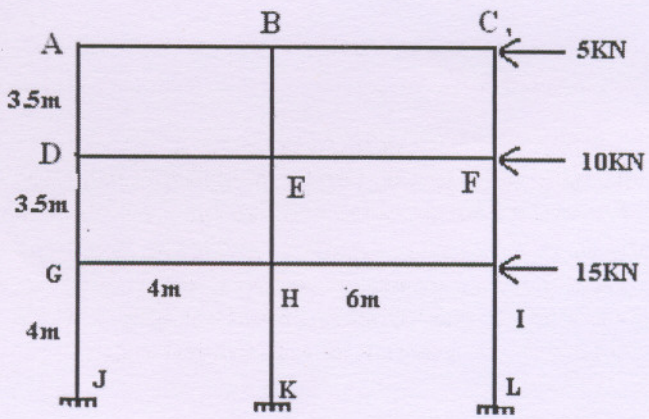
Time: 04 Hrs **Max.Marks: 100**

Instructions to the candidates :

1] Answer Q-1 or Q-2, Q-3 or Q-4, from section-I And Q-5 or Q-6 Q-7 or Q-8 from Section-II
2] Answers to the two sections should be written in separate books
3] Figures to the right indicates full marks
4] IS 456-2000, IS 1343, IS 3370 are allowed
5] Assume suitable data wherever necessary
6] Use of electronic non programmable calculator is allowed

SECTION-I

Que-1 (A)	Explain Systems of Prestressing	[5]
(B)	Explain need of High grade materials in prestressing systems	[5]
(C)	An unsymmetrical I-section is used to support an imposed load of 15 KN/m over a span of 15 m , the sectional details are top flange 600 x200 mm, web 200 x 700 mm, and bottom flange 350x350 mm, the effective prestressing force of 950 KN is located 100mm from soffit of the section at mid span , cable profile is parabolic concentric at support , calculate extreme fiber stresses in concrete at mid span at initial and final stage , take loss ratio as 0.85 and unit weight of concrete as 25 KN/m^3	[15]
	OR	
Que-2(A)	Explain in detail losses of Prestress due to friction	[5]
(B)	State advantages and disadvantages of Prestress Concrete	[5]
(C)	A post tensioned prestress concrete beam section has top flange 400x150mm, web 125 x 500 mm and bottom flange 350 x 200 mm, is simply supported over a span of 12 m. the beam is prestressed with 3 no's of 12/7 Freyssinet parabolic cables with fy =1500 Mpa with their C.G at 120 mm from extreme bottom fiber, stressed one at a time from both the ends , Calculate the total loss of prestress at the age of 100 days , if the coefficient of friction =0.28 , k=0.0026/m length of cable , Slip of anchorage is 1.5 mm , Cc=2.1, Es=210 Gpa , Concrete grade M45, Creep and relaxation of steel =2% of initial stress	[15]
Que-3	Design a post tensioned prestressed concrete T or I – Section beam for flexure to carry a live load of 15 KN/m over a simply supported span of 18 m with M 45 grade of concrete and Freyssinet cables of 12/5 (f_Y= 1750 Mpa) or 12/7(f_Y= 1500 Mpa) , including the design of end block , draw sketches showing cable profile and end block reinforcement details , check for stresses in concrete & deflection is required	[25]
	OR	
Que 4(A)	State what are the remedial measures to be taken to reduce losses in prestress?	[5]
(B)	A Post tensioned prestressed concrete two way slab 6mx 9m , with discontinuous edge to support the imposed load of 3.5 KN/m^2, Use S3 strands each having area of 100 mm^2 and F_Y= 1900 Mpa , check the safety of slab against collapse and deflection at service loads use M40 Concrete	[20]

	SECTION-II	
Que-5	Fig(1) shows an intermediate frame of multistoried building , the frames are spaced at 5m centre to centre , analyze the rigid jointed frame taking Live load and Dead load of Slab 3 KN/m^2 and 4 KN/m^2 for panels AB and BC respectively , the self weight of beam AB is 4 .5 KN/m and for BC is 3.00 KN/m , the relative stiffness are marked on the figure , use portal method for analyzing the frame for horizontal forces and proper substitute frame for vertical loads , Design the section ABC for combined effect of vertical and horizontal loads . Adopt 15 % redistribution of moments for vertical load moments Use M20 and Fe 500 	[25]
	OR	
Que-6(A)	Write detail note on Substitute frame method	[8]
(B)	Analyze the rigid jointed frame shown in fig (2) by cantilever method for lateral loads , flexural rigidity of all members is same , analyze the beam DEF using proper substitute frame if it is subjected to vertical ultimate Live and Dead load including its self weight of intensities 18 KN/m and 20 KN/m on DE and 22 KN/m and 25 KN/m on EF respectively , calculate maximum span moment for DE and support moment at E , Design the beam DEF for combined effect of vertical and Horizontal loads adopt 15 % redistribution of moments for vertical load moments Use M20 and Fe 500 	[17]

Que-7	Design a T-shape retaining wall for leveled backfill along with surcharge, the height of wall is 5 met. $\Phi=30^0$, $\gamma=18$ KN/m^3 , and additional surcharge at the face of wall is 6 KN/m^2 , The coefficient of friction between the base slab and under laying strata is 0.52, Use M25 and Fe500 , draw the lateral pressure diagram and details of reinforcement of stem and base slab showing curtailment if any	[25]
	OR	
Que-8(A)	Compare slab type and slab and beam type of combined footing	[5]
(B)	Design a rectangular combined footing without rib for the following data 1) C/C Distance between the columns=3.5m 2) Working Load on First column=400KN 3) Working Load on Second column=500KN 4) S.B.C of soil=175 KN/m^2 5) Material =M20 and Fe=415 Draw SFD and BMD , Show all detail calculations , show complete details of reinforcement	[20]