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Invigilator's Signature :	

CS/B.Tech (CE-NEW)/SEM-8/CE-801/3/2010 2010

ADVANCED STRUCTURAL ANALYSIS

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

1.	Choose the correct alternatives for any <i>ten</i> of the following :
	$10 \times 1 = 10$

- Size of the stiffness matrix for a structure having 3 DOF
 is
 - a) 3×3

b) 3×2

c) 2×2

- d) 2×3 .
- ii) Basic wind speed is measured at m height in India.
 - a) 12

b) 15

c) 10

d) 20.

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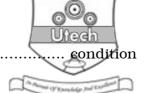
iii)	Isop	parametric elemen	nt is tha	at v	where		ch r of the
	shape function of deformation and geometry is						
	a)	equal	b)	unequ	ıal	
	c)	symmetric	d)	asym	metric.	
iv)	As]	per IS 1983 2002	there a	e.		nos. of	seismic
	zones in India.						
	a)	5	b)	3		
	c)	4	d)	2		
v)	A material is said to be more seismic efficient if it is						t is
	a)	ductile					
	b)	brittle					
	c)	malleable					
	d)	isotropic.					
vi) The problem where boundary condition							nown is
termed as							
a) Boundary value problem							
	b) Initial value problemc) Equilibrium problem						
	d)	Eigenvalue prob	lem.				
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vii)	A cylindrical shell is a shell.						
	a)	hyper	b)	singly ruled			
	c)	doubly ruled	d)	non-developable.			
viii)	Anti	clastic shells are the s	hells	having Gauss			
	curvature.						
	a)	Negative	b)	Positive			
	c)	Zero	d)	Tangent.			
ix)	If th	ne live load is greater	than	$3kN/m^2$, the live load			
	considered for seismic mass calculation is						
	a)	25% of live load	b)	50% of live load			
	c)	20% of live load	d)	5% of live load.			
x)	A sy	nclastic shell is a					
	a)	singly curved shell	b)	developable shell			
	c)	shell in translation	d)	doubly curved shell.			
xi)	Flexibility method is a matrix of						
	a)	Force method	b)	Displacement method			
	c)	Energy method	d)	Numerical method.			

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xii) In Force method we want to achieve in boundaries.



- a) Equilibrium
- b) Compatibility
- c) Consistency
- d) Deformation.

GROUP - B

(Short Answer Type Questions)

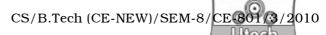
Answer any *three* of the following. $3 \times 5 = 15$

2. Show that if a dummy force applied at any point of truss and force generated any i^{th} member due to external load is P_i and due to application of unit load is K_i the deflection in the direction and location of the dummy force is $\Sigma P_i K_i L_i / AE$.

3.

Fig-(a) shows a rectangular 2-D element. Find the shape function using natural co-ordinate system (Lagrangian shape function)

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- 4. Form the stiffness matrix of a beam element subjected to axial & shear force and bending moment.
- 5. Write short notes on the following:
 - a) Interpolation function
 - b) Flexibility and stiffness
 - c) Statical indeterminacy and kinematic indeterminacy.
- 6. Describe the different categories of shell with a sketch.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

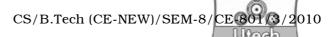
7. Solve the truss using flexibility method. Assume AE constant for the structure.

8. Find out the redundant forces using stiffness method

ess method.

- 9. What are the basic steps to be followed in a finite element formulation? Formulate the stiffness matrix and hence the equation considering the virtual work using finite element technique for a truss element. 5 + 10
- 10. The figure below [fig(d)] shows a grid plan of a 5 storeged building situated at New Delhi. Height of the ground floor is 2·4m from GL. Floor to floor height of the building is 3m. Find out the nodal force generated in either sides of the building using pressure coefficient method.

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11. Derive the fourth order differentia equation of isotropic plate

simply supported at four sides subjected to pure bending.

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