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10CV81

Eighth Semester B.E. Degree Examination, June/July 2017
Advanced Concrete Technology

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of IS10262-2009 is permitted and ACI code permitted.

PART – A

1 a. Explain the structure of hydrated cement paste, with a neat sketch. **(10 Marks)**

b. Discuss the factors that effect the strength and elasticity of concrete. **(10 Marks)**

2 a. Emphasize the function of "plasticizer" as a water reducing agent with neat sketch. **(08 Marks)**

b. How does super plasticizer influence the behaviour of concrete in fresh and hardened state? **(12 Marks)**

3 a. List the methods available for proportioning concrete mix. **(04 Marks)**

b. Design a concrete mix for a reinforced concrete structure with the following data, as per IS recommendations.

- Characteristic strength of 28 days – 25 MPa.
- Max. nominal size of agg. angular – 20 mm
- Degree of workability – Medium
- Fine aggregate – Natural river sand confirming to zone-III
- Cement – Ordinary Portland grade 43
- Sp. gravity – 3.15
- Bulk density – 1450 kg/m^3
- Aggregate properties -

	FA	CA
- Sp. gravity	2.60	2.65
- Bulk density, kg/m^3	1700	1800
- Free surface moisture, %	2.0	1.0
- Fineness modulus	2.2	6.0

(16 Marks)

4 a. State the factors influencing the permeability of concrete. Explain how size of agg. affect permeability. **(08 Marks)**

b. How does Alkali-Aggregate reaction play a role in durability of concrete? **(08 Marks)**

c. Mention the method for controlling sulphate attack. **(04 Marks)**

PART – B

5 a. Describe the three principle categories of manufacturing ready mixed concrete. **(08 Marks)**

b. State the various tests conducted to know the property of self compacting concrete. Explain any two tests with neat sketch. **(12 Marks)**

6 a. Explain the behavior of fiber reinforced concrete in tension. **(10 Marks)**

b. Calculate the increase in cracking stress of the composite uniaxial tension for a steel fiber reinforcement cement having volume fraction of fiber = 0.025. Given $E_f = 180\times10^3$ N/mm^2, $E_m = 20\times10^3$ N/mm^2. Also calculate modulus of the composite. **(10 Marks)**

7 a. What are the different aggregates that would be used in light weight concrete? Mention the demerits of light weight concrete. **(08 Marks)**

b. Design a light weight concrete mix to suit the following requirements:
(i) Specified 28 day comp. strength = 12 N/mm^2
(ii) Control factor = 0.8
(iii) Type of agg = leftag & leca
(iv) Required workability – High
(v) Relative density [air] = 1.3
Fine and coarse aggregates have 4% and 5% moisture content respectively. Use relevant codes/charts. **(12 Marks)**

8 a. List the tests conducted on Hardened concrete. Explain the tension test on concrete specimen. **(10 Marks)**

b. Mention the properties of hardened concrete that could be evaluated through N.D.T. Describe 'Rebound-Hammer' test. **(10 Marks)**

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10CV82

Eighth Semester B.E. Degree Examination, June/July 2017
Design and Drawing of Steel Structures

Time: 4 hrs. Max. Marks:100

Note: *1. Answer any ONE full question from Part-A and ONE question from Part-B.*
2. Use of IS800-2007, SP(6)(1)-1984 or steel tables is permitted.

PART – A

1 a. A beam ISLB 400@558.20 N/m is connected to the flange of a column ISHB 300@618 N/m. Another transverse beam ISLB 350@485.60 N/m is connected to the web of column by means of stiffened seated connection. Top of the beams are at the same level. M_{20} bolts of grade 4.6 are used for all connections. Details of bolted connection are as follows:

I. 2 ISA 150mm × 115mm × 12mm are used to connect ISLB 400 with the column by 3 bolts on each leg and 6 bolts in two vertical lines between beam and other leg of angle.

II. Seat angle for ISLB350 – ISA 100×100×10mm
Stiffener angle – 2 ISA 90×90×6 mm with 5 Nos of bolts on each leg connected to web of column. Adopt suitable filler late and pitch = 80 mm.

III. Top cleat angle 90×90×6mm with 2 bolts on each leg is used to connect top flange of two beams to column. Adopt suitable pitch.

Draw to a suitable scale
(i) Sectional elevation along beam ISLB 400@558.2 N/m
(ii) Sectional elevation along transverse beam
(iii) Side view across beam ISLB 400@558.20 N/m. **(20 Marks)**

b. A built up column of height 5.0m, consists of two ISMC 400@484.6 N/m placed back to back at a spacing of 260 mm and provided with single lacing system using 65 F10 flats, inclined at 45°. 6mm fillet weld of length 100mm is required to connect flat and flange of column. Two tie plates of size 400×250mm × 10mm are used at top and bottom of column and are connected to flange of column by 5mm size fillet weld alround. Draw to a suitable scale. (i) Elevation (ii) Sectional plan. **(10 Marks)**

2 a. A column splice is provided between upper story column ISHB 200@ 366 N/m and a lower storey column ISHB 200@366 N/m and a lower storey column ISHB 250@500 N/m. The columns are co-axial. At junction between face of columns a base plate of 40 mm thickness is provided. Four numbers of web cleat angle ISA 100×100×8 mm are used to connect web of column with the base plate using 2 bots along each leg of angles. Flange splice plate of 10mm thick is provided with suitable filler plate. 6 No. of bolts is provided in 2 vertical rows at each flange of column for connection. Two numbers of extra bolts are provided at each face of upper column due to filler plate. All the bolts used for the joints are M_{20} (10k) HSFG bolts. Adopt suitable pitch and edge distance for bolts.
Draw to a suitable scale;
(i) Elevation of column splice (ii) Side view. **(15 Marks)**

b. Draw to a suitable scale sectional plan, front elevation and side elevation of a column with slabbase using following data:
Column – ISHB 350@ 710.2 N/m
Base plate – 650mm × 500mm × 35mm.
Cleat angle – ISA 130×130×8 mm of length 500mm.
Concrete pedestal – 1.20m × 1.00m × 0.70m.
Anchor bolts – 4 Nos of 16mm diameter near each corner of base plate.
4 Nos of M_{20} bolts on each side of flange to connect cleat angle to the column and same nos of countersunk bolts to connect angles to base plate.
Web cleat angle – ISA 75×75×8 mm with 4 mm weld alround (2 Nos). **(15 Marks)**

PART – B

3 Line diagram of a Howe truss with tabulation of member forces are shown in Fig.Q3. Design various member of roof truss along with their end connections with gusset plate of 10 mm thick, by using M_{16} bolts of grade 4.60. The truss rests on 300mm × 500mm size column made of M_{20} grade concrete. Design the support bearing plate, base plate for a reaction of 120 kN and anchor bolts for an uplift force of 18 kN. **(40 Marks)**
Draw to a suitable scale:
(i) Elevation of truss greater than half span.
(ii) Enlarged view of support joint
(iii) Enlarged view of apex joint of truss. **(30 Marks)**

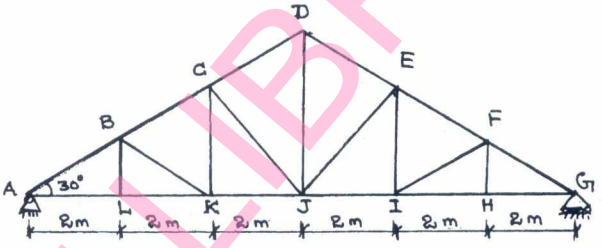

Fig.Q3

Tabulation of member forces.

Members	AB, GF	BC, FE	CD, ED	AL, GH	LK, HI	KJ, IJ	BL, FH	BK, FI	CK, EI	CJ, EJ	DJ
Force(kN)	240	210	160	208	208	182	0	30	15	66	60
Nature of force	C	C	C	T	T	T	-	C	T	C	C

C – Compression, T – Tension

4 Using post critical method design a welded plate girder of 20m span and laterally restrained throughout. It has to support a udl of 60 kN/m throughout the span, exclusive of the self weight. In addition to this girder has to support two concentrated loads of 500 kN at a distance of 5m from either supports. Design the central section, end and load bearing stiffners and their connections, inter mediate stiffeners and their connections, connection between flange and web. **(40 Marks)**
Draw to a suitable scale;
(i) Elevation of plate girder greater than half span.
(ii) Cross section at support
(iii) Cross section at midspan
(iv) Sectional plan. **(30 Marks)**

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10CV831

Eighth Semester B.E. Degree Examination, June/July 2017
Advanced Prestressed Concrete Structures

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of IS1343:1980 is allowed.

PART – A

1 a. Explain stress distribution in end block with neat sketches. **(10 Marks)**

b. The end block of prestressed concrete beam rectangular in section is 100mm wide and 200mm deep. The RSF of 100 kN is transmitted to concrete by a distribution plate 100 mm wide and 50mm deep concentrically located at the ends. Compute the bursting tension on horizontal plane where maximum tensile stress exists. Consider $K_1 = -5.0$, $K_2 = 2.0$, $K_3 = 1.25$ for $x = 0.5h$. **(10 Marks)**

2 a. Explain types of shear cracks with a neat sketch. **(06 Marks)**

b. The support section of prestressed concrete beam 100 mm wide and 250 mm deep is required to support an maximum shear force of 60 kN. The compressive prestress at the centroidal axis is 5 N/mm^2. The characteristic cube strength of concrete is 40 N/mm^2. The cover to the tension steel is 50 mm. If the characteristic tension strength of steel in stirrups is 250 N/mm^2, design suitable shear reinforcement at the section using IS codal provisions. **(14 Marks)**

3 a. Explain the advantages of using precast prestressed units in association with the insitu concrete. **(06 Marks)**

b. A precast pretensioned beam of rectangular section has dimensions 100×200 mm. The beam with effective span of 5m is prestressed by tendons at an eccentricity of 33.33mm. Initial force in tendon is 150 kN. Loss of prestress is assumed to be 15%. The beam is incorporated in T beam by casting a top flange of width 400 mm and thickness 40mm. If the composite beam supports a live load of 8 kN/m^2, calculate the resultant stresses developed in the cast and insitu cast concrete assuming the pretensioned beam as (i) Unpropped and (ii) Propped during casting of slab. Assuming the same modulus of elasticity for concrete in precast beam and insitu cast slab. **(14 Marks)**

4 a. Enlist the different stages in the design of prestressed concrete pipes. **(05 Marks)**

b. A prestressed cylinder pipe is to be designed using steel cylinder of 1000mm internal diameter and thickness 16 mm. The circumferential wire winding consists of 4mm HT wire, initially tensioned to a stress of 1000 N/mm^2. Ultimate tension strength of wire = 1600 N/mm^2; Yield stress of steel cylinder = 280 N/mm^2. The maximum permissible compressive stress in concrete at transfer is 14 N/mm^2 and no tension stresses are permitted under working pressure of 0.8 N/mm^2. Determine the thickness of concrete lining required the number of turns of circumferential wire winding and the factor of safety against bursting. **(15 Marks)**

PART – B

5 a. Explain the methods of achieving continuity in continuous prestressed concrete beams. **(08 Marks)**

b. A continuous prestressed concrete beam ABC(AB = BC = 10m) has a uniform rectangular cross-section with dimension 100×200mm. The cable carrying an effective PSF of 360 kN is parallel to the axis of beam and located at 100mm from the soffit.

(i) Determine the secondary and resultant moment at the central support 'B'.

(ii) If the beam supports an imposed load of 15 kN/m, calculate the resultant stresses at top and bottom of the beam at B. Assume density of concrete as 24 kN/m^3.

(iii) Locate the resultant line of thrust through AB. **(12 Marks)**

6 a. Briefly explain the classification of prestressed concrete columns. **(05 Marks)**

b. A prestressed concrete short column 200×200mm is reinforced with four mild steel bars of 16mm in diameter (f_y=260 N/mm^2) and prestressed by concentric tendons (f_{pu}=1600 N/mm^2) providing an initial force of 100 kN. If the loss ratio is 0.8 and cylinder strength of concrete is 40 N/mm^2, estimate the load carrying capacity of the column when it is applied (i) Concentrically (ii) at an eccentricity of 20mm and (iii) If the column is 4 m long estimate axial and eccentric loads. **(15 Marks)**

7 a. Draw neat sketches of prestressed concrete floor panels (cross-section). **(06 Marks)**

b. The deck slab of a road bridge of span 10 m is to be designed as a one way prestressed concrete slab with parallel post tensioned cables in each of which the force at transfer is 500kN. If the deck slab is required to support an UDL of 25 kN/m^2 with the compressive and tensile stress in concrete at any stage not exceeding 15 N/mm^2 and zero N/mm^2 respectively. Calculate the maximum horizontal spacing of cables and their positions at the mid span section. Assume loss ratio as 0.80. **(14 Marks)**

8 a. Draw cross sections of prestressed concrete poles. **(10 Marks)**

b. Explain advantages of prestressed concrete poles. **(05 Marks)**

c. Explain critical load conditions in the design of prestressed concrete poles. **(05 Marks)**

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10CV833

Eighth Semester B.E. Degree Examination, June/July 2017
Pavement Design

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of specified charts and tables is permitted.

PART – A

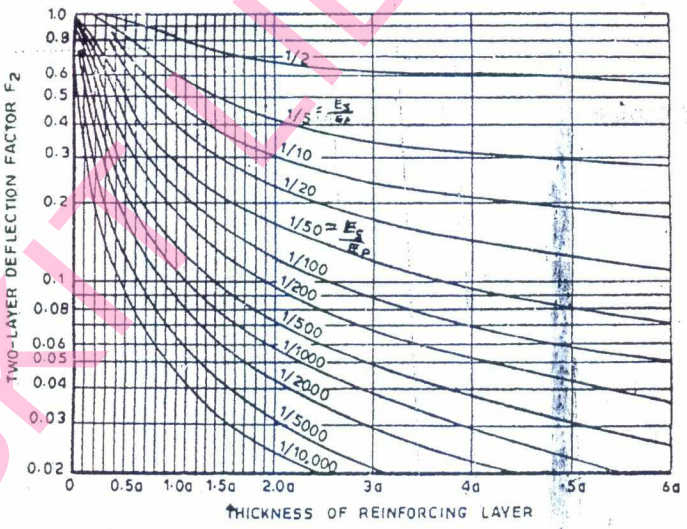
1 a. With a neat sketch of cross-section of flexible type pavement, explain the various components and briefly bring out their functions. **(10 Marks)**

b. Bring out differences between highway pavements and airfield pavements. **(05 Marks)**

c. Explain the differences between rigid and flexible pavements. **(05 Marks)**

2 a. Explain the factors that affect design and performance of highway pavements. **(06 Marks)**

b. Plate bearing tests were conducted with a 75 cm dia plate on soil subgrade and a granular base. The stress noticed, when the deflection was 0.25 cm on the subgrade soil was 0.07 MN/m^2. On the base course, the same plate yield 0.25 cm deflection under a stress of 0.14 MN/m^2. Design the pavement for an allowable deflection of 0.5 cm, under a wheel load of 40 kN and a tyre pressure of 0.5 MN/m^2. **(14 Marks)**



Relationship of F_2 and h in a Two-aLyer System (Burmister Method)

Fig.Q2(b)

3 a. Write McLeod's procedure for determining equivalent load factors. **(10 Marks)**

b. Calculate ESWL of a dual wheel assembly carrying 20.44 kN each for pavement thickness of 15, 20 and 25 cms. Centre to centre tyre spacing = 27 cm and distance between the walls of the tyres = 11 cm.
Note : Ordinary graph sheets may be used. **(10 Marks)**

4 a. Explain briefly CBR method by cumulative standard axle load for the design of flexible highway pavements. **(10 Marks)**

b. Design a flexible highway pavement section by triaxial test method (Kansas method) using the following data:

Wheel load = 44 kN — Radius of contact area = 160 mm

Traffic coefficient X = 1.7 — Rainfall coefficient Y = 0.95

Design deflection = 2.8 mm — E-value of subgrade soil $E_s = 100\times10^2$ kN/m^2

E-value of base course material $E_b = 400\times10^2$ kN/m^2

E-value of 75mm thick Bituminous concrete surface course = 1000×10^2 kN/m^2. **(10 Marks)**

PART – B

5 a. Explain the following :

(i) Radius of relative stiffness (ii) Radius of resisting section

(iii) Modulus of subgrade reaction (iv) Fatigue behavior of concrete **(10 Marks)**

b. Calculate the stresses of interior, edge and corner regions of a C.C. pavements using Westergard's stress equations using the following data:

Wheel load = 51 kN ; — Modulus of elasticity of concrete = 0.3×10^8 kN/m^2

Poisson's ratio of concrete = 0.15 ; — Pavement thickness = 18 cm ;

Modulus of subgrade reaction = 6.0×10^4 kN/m^3

Radius of contact area = 15 cm. **(10 Marks)**

6 a. As per IRC explain the stress involved in the design of dowel bars in rigid CC pavements. **(10 Marks)**

b. Determine the spacing between contraction joints for 3.5m slab width having thickness of 20cm. Consider the following two cases:

(i) For plain cement concrete (ii) For reinforced cement concrete.

Take f = 1.5, γ for CC = 24 kN/m^3. Allowable tensile stress in CC = 80 kN/m^2. Allowable tensile stress in steel = 6×10^4 kN/m^2. γ for steel = 75 kN/m^3.

Total reinforcement of 60 N/m^2 is provided and is equally distributed in both the directions. **(10 Marks)**

7 a. Explain any four typical flexible pavement failures with sketches. **(08 Marks)**

b. Discuss the functional evaluation by Benkelman beam deflection method. **(08 Marks)**

c. Discuss briefly design methods for airfield pavements. **(04 Marks)**

8 Write short notes on any four of the following :

a. Maintenance measures in rigid pavements

b. Functional evaluation by visual inspection

c. Unevenness measurements

d. Rigid pavement failures

e. Design factors for runway pavement **(20 Marks)**

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10CV834

Eighth Semester B.E. Degree Examination, June/July 2017
Earthquake Resistant Design of Structures

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Use of IS1893-2002 is permitted.

PART – A

1 a. What is plate tectonic theory of origin of earthquakes and explain associated type of movement at the plate boundaries. **(10 Marks)**

b. Explain the characteristics of different types of seismic waves. **(10 Marks)**

2 a. How are the earthquakes classified based on different aspects? **(05 Marks)**

b. Explain the different earthquake ground motion characteristics. **(08 Marks)**

c. Discuss about the response spectrum and design spectrum. **(07 Marks)**

3 a. Write a short note on following code based seismic analysis:

(i) Response spectrum method **(06 Marks)**

(ii) Equivalent static analysis **(04 Marks)**

b. Explain briefly about the seismic design philosophy. **(05 Marks)**

c. What is base isolation? Discuss briefly the principles of base isolation. **(05 Marks)**

4 a. Explain briefly about different types of vertical irregularities and their consequences. **(10 Marks)**

b. Explain /discuss about any five building configuration problems and suggest remedial measures. **(10 Marks)**

PART – B

5 Compute the seismic forces for each storey of a building situated in a seismic zone-IV by equivalent lateral force method as per IS 1893(2002) with following details:

Type of building – 0 MRF (Office building)
No. of storages – 04
Height of the building – 12 m (ht. of each floor = 3m)

Seismic weights

Roof – 2500 kN
All other floors – 3000 kN
Foundation on – Hard rock

(Assume without brick infill condition) **(20 Marks)**

6 For an RCC (SMRF) building with foundation on a soft soil, situated in zone – V as shown in Fig.Q6. Compute the seismic forces for each storey using dynamic analysis procedure.
Given, Free vibration results
Frequency : $\{ W \} = \{47.832, 120.155, 167.0\}$
Modes : $\{ \phi_1 \} = \{1, 0.759, 0.336\}$
$\{ \phi_2 \} = \{1, -0.805, -1.157\}$
$\{ \phi_3 \} = \{1, -2.427, 0.075\}$
$W_1 = W_2 = W_3 = 196.2$ kN
$K_1 = K_2 = 160 \times 10^3$ kN/m; $K_3 = 240 \times 10^3$ kN/m

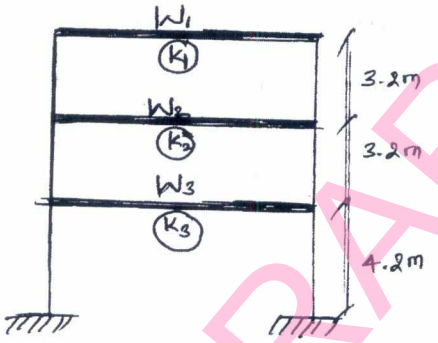

Fig.Q6 **(20 Marks)**

7 a. What are the different load combinations to be used for seismic analysis of RCC buildings as per IS1893(2002). **(04 Marks)**
b. What is ductility? Discuss different factors which are helpful in ductility of RC structures [Reinforced concrete]. **(08 Marks)**
c. Briefly describe soft storey and explain how a frame with soft storey behave under earthquake. Explain special design provisions as per IS 1893. **(08 Marks)**

8 a. Discuss the behavior of masonry buildings during earthquakes representing failure patterns. **(10 Marks)**
b. Discuss the various lateral load resting features that can be introduced in a masonry building for enhanced performance during an earthquake. **(10 Marks)**

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10CV843

Eighth Semester B.E. Degree Examination, June/July 2017
Urban Transport Planning

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define "System Approach". Explain the system approach to transport planning with a flow diagram. **(10 Marks)**

b. Explain the Interdependence of Land use and Traffic. **(10 Marks)**

2 Define :

a. Trip Generation.
b. Trip Purpose.
c. Trip Distribution.
d. Modal Split.
e. Trip Assignment. **(20 Marks)**

3 a. Explain Zoning and Study area. **(10 Marks)**

b. Explain the surveys that are usually carried out during Urban Transport Planning. **(10 Marks)**

4 a. What are the factors Governing Trip Generation and Attraction rates? **(10 Marks)**

b. Explain Multiple Linear Regression Analysis used in Trip Generation. Give examples. **(10 Marks)**

PART – B

5 a. Explain any two growth factor methods and any one synthetic method. **(10 Marks)**

b. Estimate the future trip distribution by Furness method from the following data : **(10 Marks)**

O \ D	1	2	3	4	Future Trips
1	10	20	15	18	140
2	21	16	17	14	150
3	30	21	25	27	200
4	10	9	16	13	100
Future Trips	150	120	180	160	

6 a. What are the factors affecting modal split? **(08 Marks)**

b. Draw the flow diagram for modal split carried out between Trip Generation and Trip Distribution and explain. **(12 Marks)**

7 a. List the different Assignment Techniques and explain any one Assignment techniques. **(10 Marks)**

b. Discuss on Traffic Assignment Applications in India. **(10 Marks)**

8 a. Explain the difficulties in Transport Planning. **(10 Marks)**

b. Discuss about Recent case studies on Urban Transport Planning. **(10 Marks)**

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