Shri Shankaracharya Institute of Professional Management & Technology, Raipur

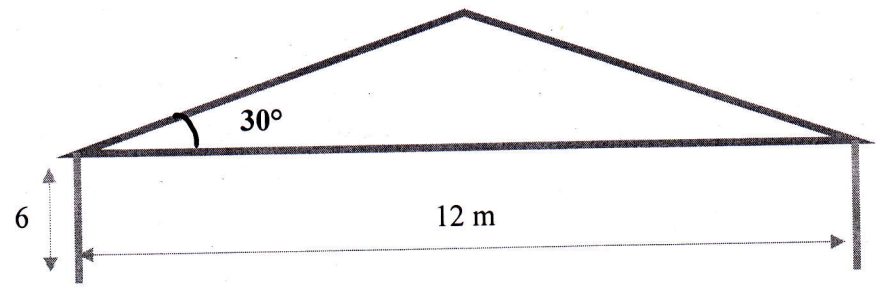
Department of Civil Engineering

Class Test – II Session: JULY – DEC, 2022 Month – DECEMBER

Semester – 7th Subject – Structural Engg. Design -III Code – D020711(020)

Time Allowed: 2 hrs. Max Marks: 40

Note: - Part A of each question is compulsory. Attempt any 1 from Part B, C in each question. Use of IS 800:2007 is permitted. Assume the suitable data if required and mention if clearly. Draw neat sketches wherever required.

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	CO's
	Part-I			
A.	What are beam column?	[4]	Understand	CO4
B.	An ISLB 300@369.8 N/m transmits an end reaction of 385 KN, under factored loads, to the web of ISMB 450 @710.2 N/m. Design a bolted frame connection. Use steel of Grade Fe410 and bolt of grade 4.6.	[16]	Analyze	CO4
C.	The following particulars refer to a trussed roof:  (i) Span of trusses = 5 m (ii) Spacing of trusses = 10 m (iii) Spacing = 1.25 m (iv) Dead Load of roof sheet = 125 KN/m^2 (v) Wind Load = 1800 N/m^2 normal to roof. Design a purlin for the truss slope of roof = 30°	[16]	Analyze	CO4
	Part-II			
A.	Write the components of roof truss.	[4]	Understand	CO3
B.	A roof truss for a factory building for a span of 20 m and a pitch of 1/5. The height of the truss is 4.5 m. The factory building which is 36 m long is situated at Delhi. Take fy = 250 N/mm2. Design of channel purlins with sag rods and angle purlins.	[16]	Analyze	CO3
C.	Design a seat connection for a beam end reaction of 84 KN. The beam section is ISMB 250@ 365.9 N/m connected to the flange of the column section ISHB 200 @ 365.9 N/m. Provide HSFG Bolts	[16]	Analyze	CO3

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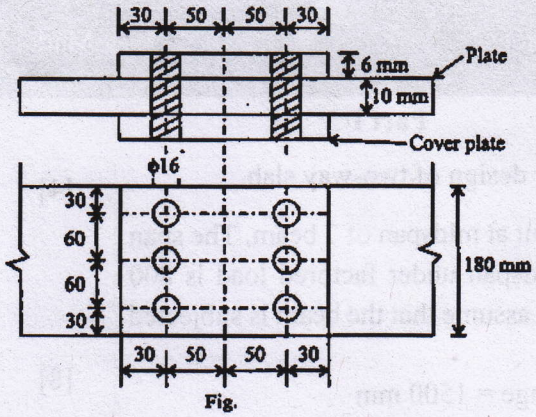
SSIPMT

Class Test – II **Session: July – December 2022** **Month – January**
Semester – 7th **Subject – Design of Structure** **Code – D000703(020)**
Time Allowed: 2 hrs. Max Marks: 40
Note: - In Part I & II, Question A is compulsory and attempt any two from B, C & D.

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	CO's
	Part I			
A.	Write detail step-step procedure for design of two-way slab.	[4]	Understand	CO1
B.	Determine the flexural reinforcement at midspan of 7 beam. The span is 10 m and design moment at midspan under factored load is 800 kN.m. Consider Fe-415 steel, M-20 assume that the beam is subjected to moderate exposure condition. i. Width of flange = 1500 mm ii. Thickness of flange = 100 mm iii. Overall height of T beam = 700 mm iv. Thickness of web = 300 mm	[8]	Analyze	CO1
C.	Design an RC slab for a room having inside dimensions 3 m x 7 m. The thickness of supporting wall is 300 mm. The slab carries 75 mm thick lime concrete at its top. The unit weight of which may be taken as 20 kN/m^3. The live load on the slab may be taken as 2 kN/m^2. Assume the slab to be simply supported at the ends. Use M-20 concrete and Fe-415 steel.	[8]	Analyze	CO1
D.	Design a cantilever slab to carry a live load of 3.00 kN/m^2. The overhang of the slab is 1.25 mt. (Use LSM)	[8]	Apply	CO1
	Part II			
A.	What are the IS 456: 2000 specifications regarding, columns? Explain use of moment interaction diagram and label it.	[4]	Understand	CO2
B.	A reinforced concrete column 340 x 500 mm in section is reinforced with 10 bars of 20 mm dia. Consisting of 3 bars along each short edge and remaining 4 bars equally distributed along long faces with 2 bars on each face. The column is subjected to a ultimate load of 1400 kN at an eccentricity of 80 mm along x axis and 60 mm about y axis. Check the adequacy of the section. Take Pu/fckbd = 0.438, Mu/fcubd^2 = 0.109 for d'/D = 0.10 and Pu/fckbd = 0.438 and Mu/fckbd^2 = 0.116 for d'/ D = 0.15.	[8]	Analyze	CO2
C.	A RCC column of size 400 mm x 600 mm, subjected to axial load & bi-axial bending, is provided with 1.6% longitudinal reinforcement. Check whether the column is safe or not, for the following data Pu = 2000 kN; Mux = 140 kNm, Muxl = 282.2 kNm, Muy = 90 kNm, Muyl = 180.5 kNm.	[8]	Analyze	CO2

D.	Two plates 180 mm x 10 mm each are connected by a double cover butt joint with 16 mm diameter bolt as shown in Fig. The cover plate provided is 6 mm thick. Determine the strength of the joint.  Fig.	[8]	Apply	CO2

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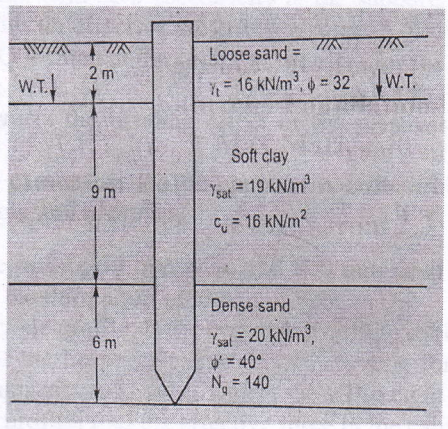
Class Test – II **Session: July-December, 2022** **Month – January**
Semester – 7th **Subject – Foundation Engineering** **Code – D020713 (020)**
Time Allowed: 2 hrs. **Max Marks: 40**

NOTE- Question 1 of each part is compulsory
Solve any two questions from 2,3 and 4 from each part

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	CO's
	Part I			
1)	Explain the static and dynamic analysis used for pile foundations.	4	Understand	CO3
2)	Outline the different types of pile foundations with proper explanation and neat diagrams	8	Understand	CO3
3)	 Determine the safe load carrying capacity for the 50 cm diameter driven pile as shown above	8	Analyze	CO3
4)	In a 25 pile group the pile diameter is 0.4 m, and center to center spacing of piles is 1.5 m, if undrained cohesion = 50 kN/m^2 determine whether the failure would occur as a block failure or when the piles act individually. All piles are 15 m long. Take adhesion factor = 0.7 for shear mobilization around each pile. Also calculate the safe load for this group. (FOS = 3.5)	8	Analyze	CO3
	Part II			
1)	Under what conditions a well foundation is adopted?	4	Understand	CO4
2)	Explain the types of caissons in well foundation	8	Analyze	CO4
3)	Explain shapes and component parts of well foundation with neat sketches	8	Analyze	CO4
4)	Describe in detail the sinking of wells	8	Analyze	CO4

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SSIPMT

Class Test – II Session: Jul – Dec, 2022 Month – January

Semester – 7th **Subject – Prestressed Concrete Structures** **Code – D020732(020)**

Time Allowed: 2 hrs Max Marks: 40

*Note: - Attempt any **Two** Questions in Every Part.*

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	COs
	PART-I			
A.	A rectangular concrete beam 250 mm wide and 300 mm deep is prestressed by a force of 540 kN at a constant eccentricity of 60 mm. The beam supports a concentrated load of 68 kN at the centre of a span of 3 m. Determine the location of the pressure line at the centre, quarter span and support sections of the beam. Neglect the self-weight of the beam.	[10]	Evalauate	CO2
B.	A rectangular prestressed beam 150 mm wide and 300 mm deep is used over an effective span of 10 m. The cable with zero eccentricity at the supports and linearly varying to 50 mm at the centre, carries an effective prestressing force of 500 kN. Find the magnitude of the concentrated load Q located at the centre of the span for the following conditions at the centre-of-span section: (a) If the load counteracts the bending effect of the prestressing force (neglecting self-weight of beam), and (b) If the pressure line passes through the upper kern of the section under the action of the external load, self-weight and prestress.	[10]	Analyse	CO2
C.	A rectangular concrete beam 300 mm wide and 800 mm deep supports two concentrated loads of 20 kN each at the third point of a span of 9 m. (a) Suggest a suitable cable profile. If the eccentricity of the cable profile is 100 mm for the middle third portion of the beam, calculate the prestressing force required to balance the bending effect of the concentrated loads (neglect the self-weight of the beam). (b) For the same cable profile, find the effective force in the cable if the resultant stress due to self-weight, imposed loads and prestressing force is zero at the bottom fibre of the mid-span section. (Assume Dc = 24 kN/m3)	[10]	Evaluate	CO2
	PART-II			
A.	Discuss the various types of loss of prestress in pretensioned and post-tensioned members.	[10]	Understand	CO3
B.	A rectangular concrete beam, 360 mm deep and 200 mm wide, is prestressed by means of 15 5 mm-diameter wires located 65 mm from the bottom of the beam and three 5 mm wires, located 25 mm from the top of the beam. If the wires are initially tensioned to a stress of 840 N/mm2, calculate the percentage loss of stress in steel immediately after transfer, allowing for the loss of stress due to elastic deformation of concrete only.	[10]	Evaluate	CO3
C.	A concrete beam of 10 m span, 100 mm wide and 300 mm deep, is prestressed by three cables. The area of each cable is 200 mm2 and the initial stress in the cable is 1200 N/mm2. Cable 1 is parabolic with an eccentricity of 50 mm above the centroid at the supports and 50 mm below at the centre of span. Cable 2 is also parabolic with zero eccentricity at supports and 50 mm below the centroid at the centre of span. Cable 3 is straight with uniform eccentricity of 50 mm below the centroid. If the cables are tensioned from one end only, estimate the percentage loss of stress in each cable due to friction. Assume m = 0.35 and k = 0.0015 per m.	[10]	Evaluate	CO3

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Class Test – II Session: July-December 2022 Month – January
Semester – 7th Subject – Design of Hydraulic Structures Code –D020712(020)
Time Allowed: 2 hrs. Max Marks: 40
Note-In Part I&II. Question A is compulsory and attempt any two from B & C.

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	CO's
	Part I			
A)	Explain ogee spillway in brief.	4	Understand	CO2
B)	Discuss the various types of energy dissipater used below spillway in relation to the position of the tail water rating curve and jump height curve	16	Understand	CO2
C)	Design a suitable section for spillway of a concrete gravity dam having the downstream face sloping at a slope of 0.7H: 1V. The designed discharge for the spillway is 8000m^3/s. The height of spillway crest from river bed level is 85 m. The spillway length consists of 6 spans having a clear width of 10 m each. Thickness of each pier may be taken to be 2.5 m.	16	Analyze	CO2
	Part II			
A)	Explain the following: (i) Weir (ii) Barrage (iii) Canal fall (iv) Canal Drop	4	Understand	CO3, CO4
B)	Draw a layout of a Diversion Head Works and describe the different components of it.	16	Understand	CO3
C)	Describe the different types of canal fall.	16	Understand	CO4