GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M.Tech. (Second Semester) Regular Examinations, July – 2025

24MSEPC12001 – Advanced Reinforced Concrete Design

(Structural Engineering)

Time: 3 hrs Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

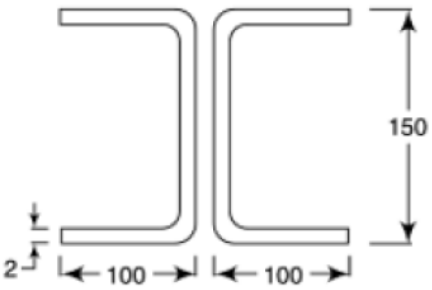
Q.1. Answer ***ALL*** questions

		CO #	Blooms Level
a.	What are the possible failure mechanisms of a pile cap?	CO1	K1
b.	What are infilled Virendeel frame foundations?	CO2	K1
c.	List the merits and demerits of providing shell foundations.	CO3	K1
d.	Describe with figure the stresses on a conical shell foundation.	CO4	K1
e.	What are the effects of large deflection?	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions

		Marks	CO #	Blooms Level
2. a.	An exterior panel of a flat slab floor is 6m x 6m along column center lines. Live load on floor is 3kN/m^2.Supporting column diameter is 500 mm. Choosing the thickness of the slab (from stiffness criteria) and appropriate dimensions for column head and drops, Examine the design moments and shear forces. Use direct design method	5	CO1	K3
b.	Calculate the reinforcement and design of square slab for a live load of 5kN/m^2 Show the reinforcement details in the Square slab. Use M20 concrete and Fe415 steel. Assume suitable data.	5	CO1	K4
	(OR)			
c.	An interior panel of a flat slab floor is 6m x 6m along column center lines. Live load on floor is 3kN/m^2.Supporting column diameter is 500 mm. Choosing the thickness of the slab (from stiffness criteria) and appropriate dimensions for column head and drops, Examine the design moments and shear forces. Use direct design method.	5	CO1	K3
d.	A square interior panel of an intermediate floor is of effective dimension 5 m x 5 m. The live load on the floor is 2.5 kN/m^2. Finishes is 1 kN/m^2. Analyse the slab using yield line approach and design the slab. Use M20 concrete and Fe 415 steel.	5	CO1	K4
3.a.	Discuss and design a single unequal angle strut to carry a load of 90 kN. The angle is connected by its longer leg to 8 mm thick gusset plate. The effective length of the member is 2.5 m. Also design the plate bolted end connections.	5	CO2	K3
b.	An ISLB 325 @ 43.1 kg/m transmit an end reaction of 125 kN to the web of ISHB 300@ 63 kg/m. Design the bolted connection . Draw the design details.	5	CO2	K4
	(OR)			
c.	A ISMB 500@ 0.869 kN/m transmits an end reaction of 130 kN to the flange of column ISHB 250@ 0.510 kN/m. Design an un-stiffened welded seat connection.	5	CO2	K3
d.	A ISMB300, @ 0.442 kN/m transmits an end reaction of 11 kN and an end moment of 80kNm to the flange of a column ISHB300, @ 0.630 kN/m. Identify and design the welded connections.	5	CO2	K3
4.a.	An ISLC300@324.7N/m(Fe410 grade of steel) is to carry a factored tensile force of 900kN. The channel section is to be welded at the site to a gusset plate 12mm thick. Summarize and design a fillet weld, if the overlap is limited to 350mm.	5	CO3	K4

b.	Design and discuss about strut of single unequal angle to carry a load of 100 kN. The angle is connected by its longer leg to 10 mm thick gusset plate. The effective length of the member is 2 m.	5	CO3	K3
	(OR)			
c.	(i)Summarize the merits and demerits of cold from light gauge steel section. (ii)Also enlist and draw the different sections used in cold from steel.	5	CO3	K3
d.	Identify and determine the allowable load per metre on the beam as shown below. Also, determine the deflection at the allowable load. The length of the column is 3.1m. the two sections are joined together by spot welding. The steel has a yield point of 235N/mm^2. Take E = 2 ×10^5 N/mm^2. 	5	CO3	K3
5.a.	Enumerate from principles the ultimate design moments for a rectangular simply supported slab panel using yield line approach. Hence the design moments for a simply supported rectangular slab 3 m x 4 m effective, subjected to a live load (working) of 2.5 kN/m^2 and finish of 1 kN/m^2. Assume suitable load factor	5	CO4	K3
b.	Design a simply supported slab of size 4m by 3m using yield line theory. The slab is subjected to a live load of 3.5kn/m^2 and floor finish of 1.5kN/m^2. Use M20 &Fe415.using Hillerborg's pattern	5	CO4	K3
	(OR)			
c.	Estimate the allowable load on the light gauge steel beam of channel section with a lip. The width of web: 300mm;Width of lip:50mm;Width of flange: 200mm;Thickness of section: 2.6mm	5	CO4	K3
d.	Design a Stanchion 3.5 m long in a building subjected to a factored load of 550 KN both the ends of a stanchion are effectively restrained in direction and position. Use steel of grade Fe410	5	CO4	K3
6.a.	A single –bolted double-cover butt joint is used to connect two plates which are 8mm thick. Assuming 16mm diameter bolts of grade 4.6 and cover plates to be 6mm thick, calculate the strength and efficiency of the joints, if 4 bolts are provided in the bolt line at a pitch of 45mm. Also determine the efficiency of the joint if two lines of bolts with 2 bolts in each line have been arranged to result in a double-bolted double-cover butt joint.	5	CO5	K4
b.	A 120mm diameter and 6mm thick pipe is fillet welded to a 14mm plate. It is subjected to a vertical factored load of 4.5kN at 1m from the welded end and a factored twisting moment of 1.8kNm. Examine and design the joint assuming shop welding and steel of grade fe410.	5	CO5	K4
	(OR)			
c.	Two plates 10mm and 18mm thick are to be joined by double cover butt joint. Summarize and design the joint for the following data. Factored design load: 750kN Bold diameter: 20mm Grade of steel: Fe410 Grade of bolts: 4.6 Cover plates 2 (one on each side): 8mm thick	5	CO5	K3
d.	Two flats of Fe410 grade steel, each 210mmx 8mm are to be jointed using 20mm diameter, 4.6 grade bolts, to form a lap joint. The joint is supposed to transfer a factored load of 250kN. Justify and design the joint and determine suitable pitch for the bolts.	5	CO5	K3

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