SARVAJANIK UNIVERSITY

S-2024 Date: 15-04-24 Time: 09:30 AM to 12:30 PM
Regular / Backlog Exam

B.ARCH - SEMESTER– IV EXAMINATION

Course Code: BRAR12402   **Total Marks: 180**
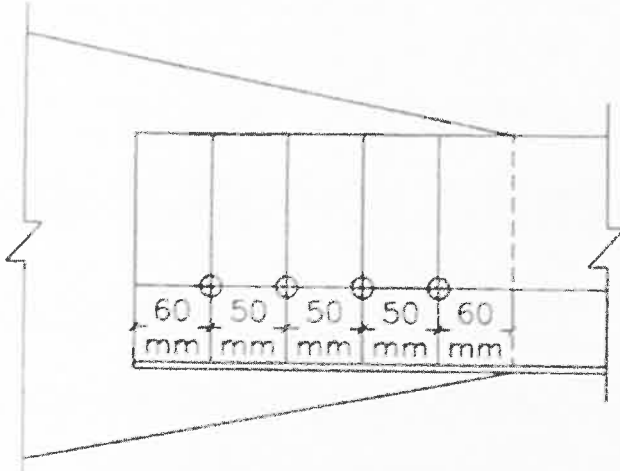
Course Name: Building Technology II- Const., Structure & Services

Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Draw a sketch wherever necessary.
5. Assume suitable data whenever necessary & specifically mention it.
6. IS 800:2007, IS 875- Part I, Part II, Part III, and Steel table are allowed to be used.
7. Use of a nonprogrammable scientific calculator is allowed.

Q.1.	Answer the following: (ANY SIX)	12 Marks
1	Draw any one detail to construct steel staircase.	
2	Mention the type of cable shown in the image.	
3	Enlist the types of connections in steel construction.	
4	Define Alternate current	
5	Which kind current flow in Residence Circuit?	
6	What is the unit of current ?	
7	The main power supply in India is	
8	What is a "Belt Truss?" Sketch and explain.	
Q.2		
(A)	Answer the following (Any TWO)	20 Marks
1	Explain the Floor Systems used in Steel Frame Structure construction, based on the case study of Yuri Mushroom Administrative Building	
2	Explain the subsoil condition and resultant challenges for the site of Taipei 101. Also Explain foundation details of the same.	
3	Explain the concept of modular construction with reference to "Container structures" along with its pros and cons.	
4	Discuss how steel structures can be impacted by environment	
(B)	Answer in Detail	30 Marks
	Design a steel structure for a Ground + Ten Story Residential building. Your answer should consist of following points:	
a)	Schematic design grid of the residence (Typical Floor Plans with service core)	5
b)	Types of components selected for building elements (Beam/Column/Slab/Walls/Staircase- Also specify Approx. size)	5
c)	Location of various structural components in plan (Structural grid/plan at various level explaining various layers, with dimensions	10
d)	Structural Assembly of the components (Primary/Secondary/Tertiary) and Important connection (Joinery) details	10

Q.3.		
(A)	**Answer the following (ANY TWO)**	**08 Marks**
1	Explain A.C and D.C	
2	Define the following 1. MCB 2 LUX	
3	Mention different types of wire and expalin any three in detail	
4	Define Earthing and how is earthing done at home.	
(B)	Draw electrical layout for the plan given in the attached sheet showing 1.SB, light points(wall and ceiling both),fan points and equipments points 2. Electric schedule Note: attach the given plan with answer book	**20 Marks**
Q.4.		
(A)	**Do as directed. / Select the correct answer**	**05 marks**
1	Which Section is preferable for column design? a) ISLB b) ISJB c) ISHB Ans d) ISMB	
2	Which of the following steel shapes is commonly used as a compression member in light steel trusses? a) I-section b) Channel Section c) Angle Section Ans d) Hollow Structural Section	
3	What is the standard shape of a W-section steel beam? a) Circular b) Square c) Rectangular d) I-Shaped Ans	
4	Identify the class of an I section, ISWB 500@ 112.5Kg/m. a) Class-1, Plastic Ans b) Class-2, Compact c) Class-3, semi-Compact d) Class-4, Slender	
5	The nature of Force Induced in truss members is. (a) Axial Force Ans (b) Transverse plus Axial force (c) Transverse Force (d) Torsional Force	
4(B)	A single unequal angle ISA 125X75X10 mm is connected to a 12 mm thick gusset plate at the ends with 4 -12 mm diameter bolts to transfer tension through the shorter leg as shown in Figure. Determine the design tensile strength of the angle section assuming that, the yield and ultimate stress of steel are 250 N/mm^2 and 410 N/mm^2 respectively.	**25 marks**

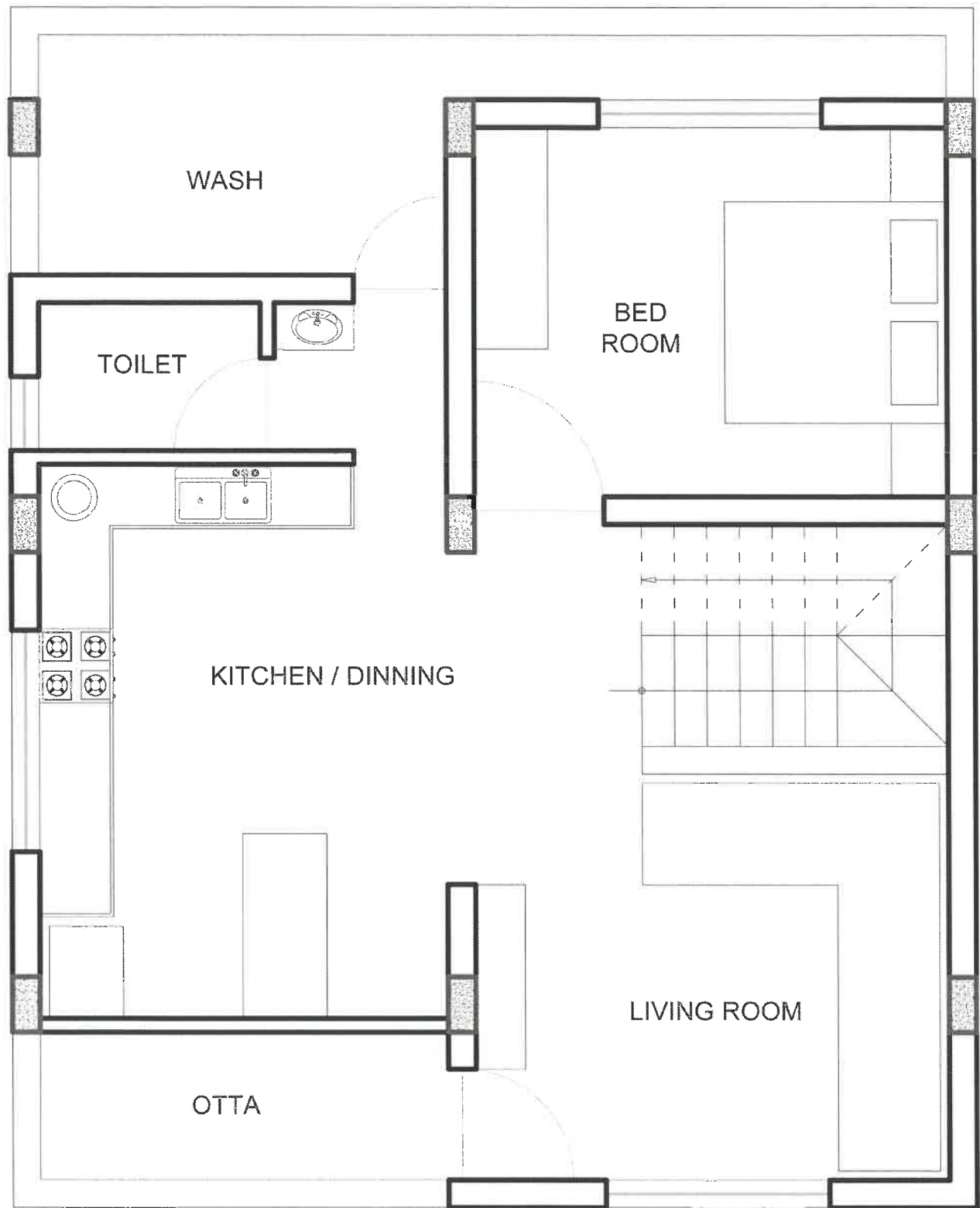| Q5	Attempt any Three questions out of these four Questions	60 marks
1)	A column comprising ISHB 400@ 82.2 Kg/m of a length 3.0 m.is used as a column. The lower end of the column is restrained against both rotation and translation, while the upper end is only restrained against translation and free against rotation. Find the load-carrying capacity of a column. Take $f_y = 250$ N/mm²	
2)	Calculate the Moment of resistance of a laterally restrained beam, ISMB 500@ 86.9 kg/m, if the span of a simply supported beam is 5.5 m and subjected to 60 KN /m uniformly distributed load including self-weight.	
3)	Design a slab-based footing for a column section ISHB 250 @ 51 Kg/m, subjected to a factored axial load of 1200 KN. Take SBC of soil =210 KN/sqm, Grade of concrete =M-15, $f_y = 250$ N/mm² , $E = 2 \times 10^5$ N/mm²	

4)	Sketch and label the following in detail.
	   (a) Beam to column Stiffened Seat Connection
	   (b) Slab-based footing.	

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FIG : 3B