

**DEPARTMENT OF ARCHITECTURE & PLANNING  
NATIONAL INSTITUTE OF TECHNOLOGY PATNA**

<b>B.Arch. (Sem-1)</b> <b>Sub: Principles of Architecture</b> <b>Sub Code: AR11112</b>	<b>End semester examinations December 2024</b> <b>Time Allotted: 3 Hours</b> <b>Max. Marks: 60</b>
--	--

*Answer only five questions out of eight questions. All questions carry equal marks. Figures are necessary for each question.*

- Q.1 What are the principles of architecture? Explain the importance of each principle of design in architecture?
- Q.2 What are the elements of architecture? Explain the importance of each element of design in architecture?
- Q.3 What are the various types of approach to building? Explain each in detail?
- Q.4 What is the Gestalt's theory of perception? Explain in detail?
- Q.5 Sketch a building which depicts symmetry, harmony and balance?
- Q.6 What is scale in a building? What are the different types of scale used?
- Q.7 What are the different types of organization in space planning?
- Q.8 Sketch Lord Buddha's statue in Rajgir is in the middle of Ghora Katora Lake.

# NATIONAL INSTITUTE OF TECHNOLOGY PATNA

END SEM EXAMINATION DEC 2024

1<sup>ST</sup> SEM ARCHITECTURE (Eng. Mathematics- MA11116)

Time: 3hrs

Answer the following questions

Full Mark: 60

Q 1 (a) If  $y = (m \sin^{-1} x)$   
Prove that  $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} - (n^2 - m^2)y_n = 0$

(b) Find nth derivative of  $x^n$  and  $a^x$

(c) Prove that  $\lg(x + 1) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots \dots \dots$

Q 2 (a) If  $x^x y^y z^z = c$  show that at  $x = y = z$ ,  $\frac{\partial^2 z}{\partial x^2} = -(x \log ex)^{-1}$

(b) If  $u = \log(x^3 + y^3 + z^3 - 3xyz)$ , show that

$$\left( \frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z} \right)^2 u = -\frac{9}{(x+y+z)^2}$$

Q 3 Solve (a)  $ydx - xdy + 3x^2y^2e^{x^3}dx = 0$

(b)  $(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$  (c)  $(D - 2)^2y = 8(e^{2x} + \sin 2x + x^2)$

Q 4 (a) Show that  $A = \begin{bmatrix} \cos\theta & 0 & \sin\theta \\ 0 & 1 & 0 \\ -\sin\theta & 0 & \cos\theta \end{bmatrix}$  is Orthogonal. Find the value of  $|A|$

(b)  $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$  Find  $A^{-1}$  (ii) Show that  $A^3 = A^{-1}$

Q 5 (a) For what values of  $k$  the equations  $x + y + z = 1$ ;  $2x + y + 4z = k$ ;  $4x + y + 10z = k^2$  have a solution? Solve them completely in each case

(b) Verify Cayley-Hamilton theorem for the Matrix  $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

$$A^3 - 8A^2 + 17A - 6I = 0$$



# NATIONAL INSTITUTE OF TECHNOLOGY PATNA

## Department of Architecture and Planning

End-Term Exam (July-Dec 2024)

Subject Code- AR11111

Subject Name- Basic Architectural Design

Note-

Total Marks: 60

Duration: 03 Hours

- Attempt all question
- Use a suitable scale and medium for drawing and drafting.
- Mention all dimensions clearly on the plan and elevation.
- Use appropriate line weights, hatching, and annotations for clarity.

### Part-I

#### Question 1

Design a bedroom with an attached toilet and a balcony. The design should focus on planning, functionality, aesthetics, and appropriate furniture placement.

(30 Marks)

Design Requirements:

A) Plan with Furniture Layout

- I. Draw a scaled floor plan of the bedroom.
- II. Ensure proper proportions for the bedroom, toilet, and balcony.
- III. Place essential furniture (bed, wardrobes, study table, seating, etc.).
- IV. Show circulation spaces clearly.

(15 marks)

B) Draft Perspective View of the Bedroom

- I. Create a perspective view that illustrates the spatial quality of the bedroom.
- II. Show furniture placement, flooring, ceiling treatment, and lighting.

(10 marks)

C) Elevation of Any One Wall

- I. Choose a wall (preferably with maximum design interest, such as the one with the bed or TV unit).
- II. Showcase material finishes, lighting, and decorative elements.

(5 marks)

### Part-II

#### Question 2

Define the following elements of design and explain their significance in visual communication with relevant examples:

(10 Marks)

- Line
- Shape
- Colour
- Texture
- Space

#### Question 3

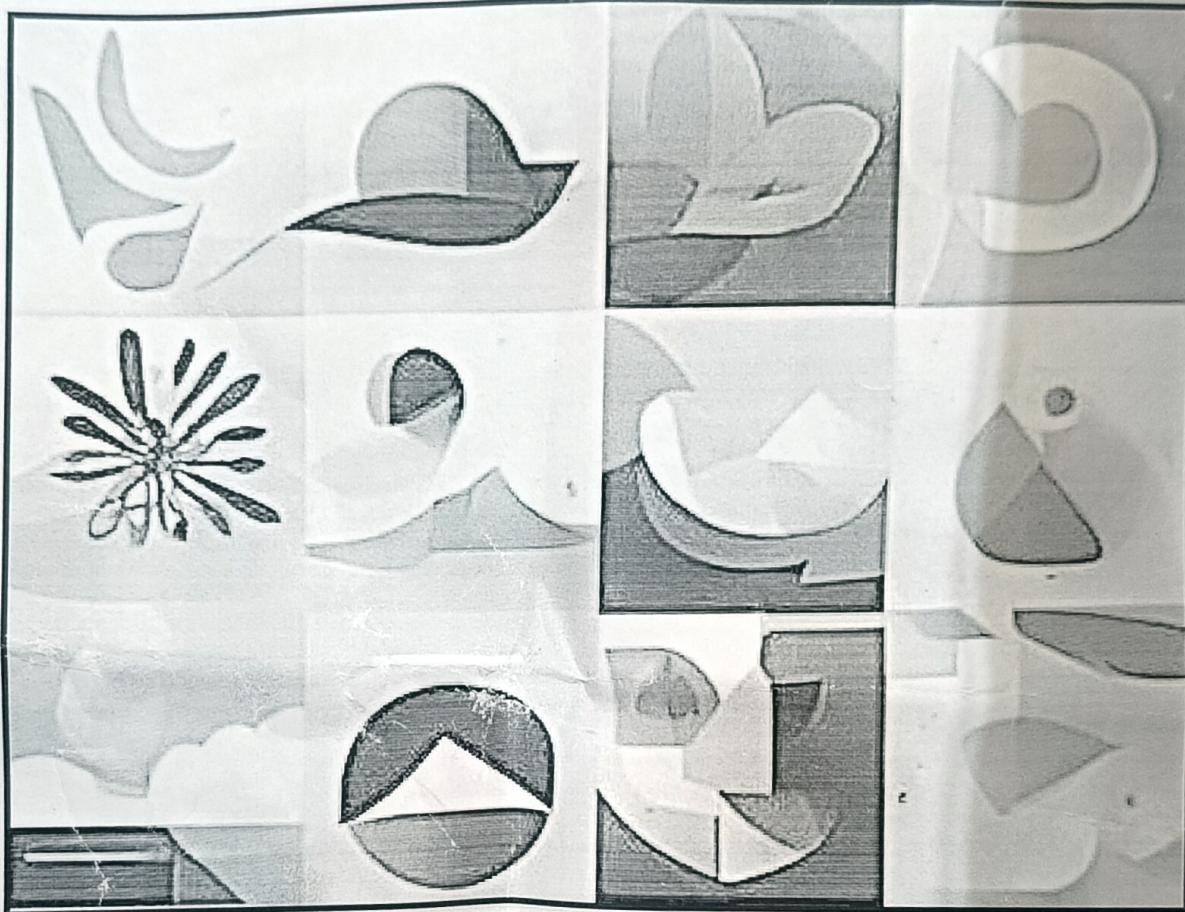
Define the following principles and explain their significance in architecture with relevant examples:

- Balance,
- Rhythm
- Emphasis
- Symmetry
- Contrast

Question 4

Draw the given figure and highlight the design elements with Color, Texture and Shades.

(10 Marks)



\*\*\*\*\* END OF QUESTION PAPER \*\*\*\*\*

# DEPARTMENT OF ARCHITECTURE AND PLANNING

NATIONAL INSTITUTE OF TECHNOLOGY PATNA

PATNA – 800005, BIHAR, INDIA

End Semester Examination July-December 2024

Subject: - Building Materials

Time: 3 Hours

Course Code: - AR11115

Full Marks: 60

Important Note: Attempt any five (6) questions from Q1 TO Q9 and draw neat sketch wherever required.

1. Write Short notes on any five types of paint. (10 marks)

2. Write Short notes on pig iron, cast iron, wrought iron, and steel. (10 marks)

3. Write Short notes on RCC, pre-stressed concrete, fiber-reinforced concrete, and ferrocement. (10 marks)

4. Write short notes on any five of the following from the process of preparation of concrete.

i. Batching of concrete (10 marks)

ii. Mixing of concrete

iii. Transportation and placing of concrete

iv. Bleeding

v. Segregation

vi. Concrete compaction

vii. Accelerator

viii. Retarders

5. Write Short notes on cement mortar, lime mortar, mud mortar, and special mortars. (10 marks)

6. Explain the process of manufacturing of ordinary Portland Cement. (10 marks)

7. Write short notes on Veneers, plywood, particle board, and block board. (10 marks)

8. Write short notes on Ceiling and ridge tiles, Clay terracing tiles, and tiles for lining canals and drains. (10 marks)

9. Give a comparison between burning bricks in a kiln and in a clamp. (10 marks)

