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B.Arch. Degree I Semester Regular Examination November 2021

AR 1102 BUILDING MATERIALS AND CONSTRUCTION-I (2021 Scheme)

Time: 4 Hours

Maximum Marks: 100

PART A (Answer *ALL* questions)

(8 × 5 = 40)

- I. Write short notes on the following
- (a) Construction principle with respect to structural stability
 - (b) Concept of span
 - (c) Steps in manufacturing of clay bricks
 - (d) Water cement ratio
 - (e) Horizontal and vertical subsystems
 - (f) Foundations
 - (g) Rat trap bond
 - (h) Header bond and stretcher bond.

PART B

(4 × 10 = 40)

- II. Explain with neat sketch, the different building components. (10)
- OR**
- III. What are different types of support and explain the various supported elements. (10)
- IV. Explain the quarrying process of stone. What are the different forms of artificial stones? (10)
- OR**
- V. Discuss different field tests and laboratory tests for cement in detail. (10)
- VI. Explain the various structural systems of a building. (10)
- OR**
- VII. Explain with neat sketch the various types of shallow foundations. (10)
- VIII. Define English and Flemish bond with sketches. Explain the difference between English Bond and Flemish bond. (10)
- OR**
- IX. Explain classifications of bricks. What are the rules to be observed to get a good brick bond? (10)

PART B

(1 × 20 = 20)

- X. Draw to a suitable scale; the plan of alternate courses and elevation of an L-shaped 1 thick wall in Double Flemish bond. (20)
- OR**
- XI. Draw to a suitable scale; the plan of alternate courses and elevation of an L-shaped 1^{1/2} thick wall in English bond. (20)

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AR 1103 HISTORY OF ARCHITECTURE-I ANCIENT CIVILIZATIONS (2021 Scheme)

Time: 3.Hours

Maximum Marks: 100

(Support the answers with neat sketches)

PART A (Answer ALL questions)

(8 × 5 = 40)

- I. Write short notes on the following:
- Stonehenge
 - Walled settlement of Jericho
 - Ziggurat of Ur
 - Persepolis
 - Temple of Amun at Karnak
 - Obelisks
 - The Great Bath
 - Planning pattern of Harappa

PART B

(4 × 15 = 60)

- II. Elaborate on the evolution of shelter from caves to built structure during Neolithic period. Give sufficient sketches and name them.
- OR
- III. Describe in details the architectural features of the settlement of Çatal Huyuk.
- IV. What were the different factors that influenced the architectural characters of Ancient Mesopotamian cities and explain how these factors contributed in evolving their identity?
- OR
- V. What are the salient features of Ancient river valley civilization of Mesopotamia?
- VI. Explain with examples why most of the grand monuments built by the ancient Egyptians were dedicated to their dead? How was it possible for them to complete construction of such monumental scale?
- OR
- VII. Explain the evolution of tomb architecture in Ancient Egypt.
- VIII. Describe with neat sketches the sociocultural, religious and political systems of people who lived in cities built in the Indus-Saraswati basin during the 2500-1500 BC period.
- OR
- IX. Why was the Indus valley civilization considered as one of the most advanced civilization of its time? What are the possible causes for the decline of such a civilization?

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AR 1104 ARCHITECTURAL GRAPHICS AND DRAWING I

(2021 Scheme)

Time: 4 Hours

Maximum Marks: 100

(One A2 drawing sheet is to be supplied)

(4 × 25 = 100)

- I. Make a composition of a landscape with trees, house, human beings etc. Render in pencil with light and shade effect.
OR
- II. Create a composition with basic geometric shapes (Any colour medium can be used.)
- III. Explain in detail the importance of colour and texture in art.
OR
- IV. Explain the importance of Line and Shape in visual art.
- V. Explain the principle of 'emphasis' in art. With the help of a painting explain how emphasis can be achieved in a painting/design?
OR
- VI. What are the principles of design essential for a great composition? Explain it with illustrative sketches.
- VII. Make a coloured composition of Fruits or Vegetables. Any colour medium can be used.
OR
- VIII. Make a still life composition with kitchen utensils. Light, shade and shadow should be maintained.

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AR 1105 GEOMETRICAL DRAWING

(2021 Scheme)

Time: 4 Hours

Maximum Marks: 100

PART A

(Answer *ALL* questions)

(8 × 5 = 40)

- I. Write short notes on the following (Illustrate all answers with sketches)
- (a) Types of conic sections
 - (b) Superscribe a pentagon on a circle of diameter 50 mm
 - (c) Section planes
 - (d) Principal methods of developments
 - (e) Isometric scale and isometric axes
 - (f) Define the following based on theory of perspective projection
 - (i) picture plane
 - (ii) vanishing point
 - (iii) station point
 - (iv) Ground plane
 - (g) Differentiate between shade and shadow
 - (h) Importance of scio-graphy in architecture

PART B

(4 × 15 = 60)

- II. Construct an Archimedean spiral for one and half convolution if the initial and final radius vectors are 30 and 240 mm respectively. Draw a tangent and normal to the spiral at a point 78 mm from centre.

OR

- III. The Major axis and Minor axis of an Ellipse are 130 mm × 80 mm. Construct the Ellipse by Intersecting Arcs method.

- IV. A pentagonal pyramid of base sides 30 mm and axis height 55 mm is resting on HP with a corner of the base touching HP. The two base edges containing that corner are equally inclined to HP. The pentagonal base is inclined to HP at 50° and the axis appears to be inclined to VP at 40°. Draw its projections.

OR

- V. A hexagonal prism base edge 30 mm and height 60 mm is resting on HP on its base with one base edge parallel to VP. It is cut by a plane inclined at 30° with HP, perpendicular to VP and passing through a point on the axis 25 mm above HP. Draw the development of surfaces of prism.

- VI. Draw isometric projection of a funnel consisting of cylinder and frustum of a cone. The diameter of the cylinder is 20 mm and the top diameter of the funnel is 68 mm, the height of the frustum and the cylinder are each equal to 40 mm.

OR

- VII. A pentagonal prism of side 25 mm and length 50 mm lying on ground on one of its rectangular faces and one pentagonal face touching the PP. The station point is 52 mm in front of picture plane, 35 mm above the ground plane passing through the center of block. Draw the perspective of the block.

VIII. Draw sciography for following conditions:

- (i) square plane 50 mm side perpendicular to both the planes, 20 mm above HP and 40 mm away from VP.
- (ii) Isosceles triangle of sides 60 mm and 50 mm, 50 mm respectively, is placed 60 mm above HP and perpendicular to HP and 40 mm away from VP and parallel to VP.
- (iii) Circular plane of diameter 50 mm perpendicular to VP parallel to HP, 40 mm above HP and 20 mm away from VP.

OR

IX. Draw sectional perspective of a room of size 300 × 300 × 300. Add furniture such as sofa set, table, and fan, wall hangers etc.

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AR 1106 MATHEMATICS (2021 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A (Answer ALL questions)

- I. (a) Explain Elementary Transformation. (8 × 5 = 40)
 (b) Reduce to Echelon form
- $$\begin{bmatrix} 3 & -4 & -5 \\ -9 & 1 & 4 \\ -5 & 3 & 1 \end{bmatrix}$$
- (c) Solve the exact equation $(x^2 - ay)dx = (ax - y^2)dy$.
 (d) Solve the equation $(D^2 - 4D + 4)y = e^{2x}$.
 (e) Define:
 (i) Random Experiment
 (ii) Sample Space
 (iii) Discrete Sample Space
 (iv) Continuous Random Variable
- (f) Check the given function for which $f(x) = \begin{cases} \frac{1}{18}(3+2x) & ; 2 \leq x \leq 4 \\ 0 & ; \text{otherwise} \end{cases}$ is a pdf or not. Find $P(2 \leq x \leq 4)$.
 (g) If x follows Poisson distribution with $P(1) = P(2)$. Find the mean of the distribution and $P(4)$.
 (h) Out of 800 families of 5 children each. How many would you expect to have (i) 3 boys (ii) 5 girls?

PART B

- II. (a) Find the inverse of the matrix (4 × 15 = 60)

$$\begin{bmatrix} 1 & -1 & 1 \\ 4 & 1 & 0 \\ 8 & 1 & 1 \end{bmatrix}$$
 using elementary transformation. (7)
 (b) Solve the following systems of equation by matrix method (8)

$$\begin{aligned} x + y + z &= 8 \\ x - y + 2z &= 6 \\ 3x + 5y - 7z &= 14 \end{aligned}$$

OR

- III. (a) Find the rank of the matrix (7)

$$\begin{bmatrix} 5 & 6 & 7 & 8 \\ 6 & 7 & 8 & 9 \\ 11 & 12 & 13 & 14 \\ 16 & 17 & 18 & 19 \end{bmatrix}$$

by reducing it into an Echelon form using elementary operations.

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- (b) Use Gauss - Jordan method to find the inverse of the following matrix (8)

$$\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$$

- IV. (a) Solve the differential equation $y(2xy + e^x)dx = e^x dy$, reducing to Bernoulli's equations. (7)

(b) Solve $\frac{dy}{dx} + \frac{x}{1-x^2} y = x\sqrt{y}$. (8)

- V. (a) Solve $(1 + y^2)dx = (\tan^{-1}y - x)dy$. (7)

(b) Solve $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} = e^x + \sin 2x$. (8)

- VI. (a) Find the value of k for which $f(x) = \begin{cases} kx(1-x) & ; 0 \leq x \leq 1 \\ 0 & ; \text{otherwise} \end{cases}$ is a p.d.f. (8)

Find Mean and Standard Deviation.

- (b) Three unbiased coins are tossed. Find the expectation of the number of heads. (7)

OR

- VII. (a) A discrete random variable X has the following probability distribution (8)

x	: 0	1	2	3	4	5	6	7	8
$f(x)$: a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$

(i) Find a

(ii) Find Probability $P(x < 3)$

(iii) Find Variance

- (b) Let X be a random variable with p.d.f $f(x) = \begin{cases} 2(1-x) & \text{when } 0 \leq x \leq 1 \\ 0 & \text{elsewhere} \end{cases}$ (7)

Find $E(6X + 3X^2)$.

- VIII. (a) From the following data obtain the two Regression equations (8)

x	6	2	10	4	8
y	9	11	5	8	7

- (b) In a lot of 500 solenoids 25 are defective. Find the probabilities of a sample of 20 solenoids chosen at random may have (7)

(i) No defective

(ii) Two defectives

(iii) Not more than 2 defectives

(iv) 2 or 3 defectives

OR

- IX. (a) Use the principle of least square, fit a straight line to the following data. Find y when $x = 1986$. (8)

x	:	1941	1951	1961	1971	1981
y	:	8	10	12	10	16

- (b) Fit a Poisson distribution to the following data (7)

x	:	0	1	2	3	4
y	:	122	60	15	2	1