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B.Arch. Degree I&II Semester Examination April 2021

AR 1101 ARCHITECTURAL DESIGN I

(2014 Scheme)

Time : 4 Hours

Maximum Marks : 100

Instructions:

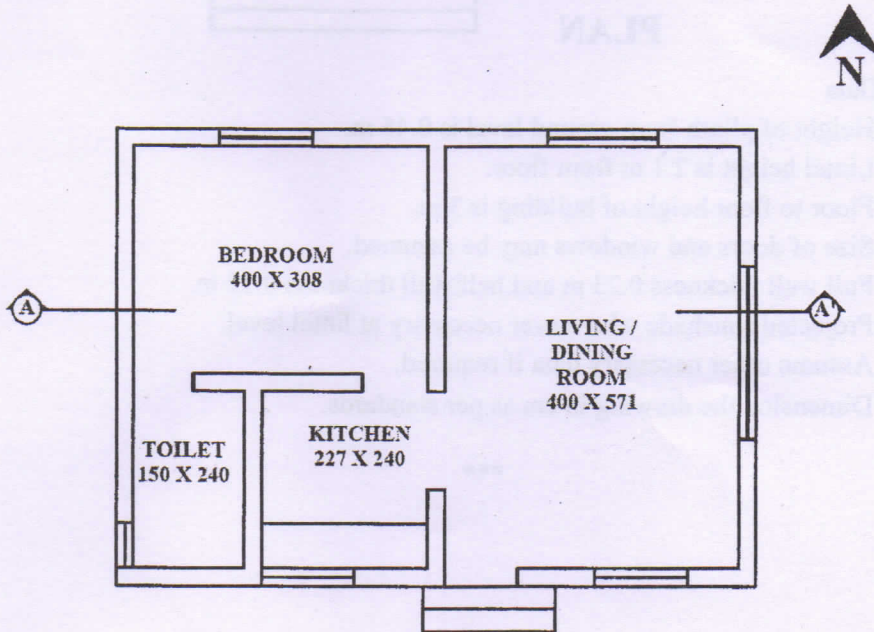
- 1 drawing sheet (A1 size) and 2 butter sheets must be supplied.
- The drawing should be properly dimensioned, labelled in good lettering and rendered appropriately.
- Importance will be given to drafting quality, correctness of drawing and conformity with drafting standards.

PART A

(Answer ANY ONE question)

(1 × 100 = 100)

- Prepare a neatly drafted, detailed technical drawing for the building plan given below.
 - Floor plan with plastering and door/window frames showing furniture layout in scale 1:50. (50)
 - Front Elevation in scale 1:50. (25)
 - Section through the section line A-A' in scale 1:50. (25)



PLAN

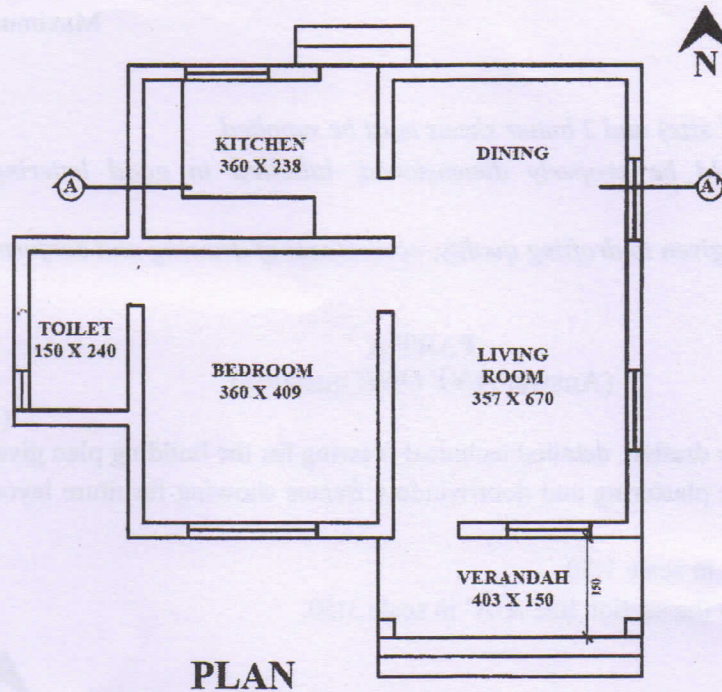
Design Data

- Height of plinth from ground level is 0.45 m.
- Lintel height is 2.1 m from floor.
- Floor to floor height of building is 3 m.
- Size of doors and windows may be assumed.
- Full wall thickness 0.23 m and half wall thickness 0.12 m.
- Projected sunshade where ever necessary at lintel level
- Assume other necessary data if required
- Dimension the drawing in cm as per standards

OR

(P.T.O)

- II. Prepare a neatly drafted, detailed technical drawing for the building plan given below.
- Floor plan with plastering and door/window frames showing furniture layout in scale 1:50. (50)
 - Front Elevation in scale 1:50. (25)
 - Section through the section line A-A' in scale 1:50. (25)



Design Data

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- Full wall thickness 0.23 m and half wall thickness 0.12 m.
- Projected sunshade where ever necessary at lintel level.
- Assume other necessary data if required.
- Dimension the drawing in cm as per standards.

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B.Arch. Degree I & II Semester Examination April 2021

AR 1102 BUILDING MATERIALS AND CONSTRUCTION - I (2014 Scheme)

Time: 4 Hours

Maximum Marks: 100

PART A (Answer *ALL* questions)

(8 × 5 = 40)

- I. Write short notes on the following.
- (a) Classification of rocks with examples.
 - (b) Water Cement ratio.
 - (c) Briefly explain Venetian arch.
 - (d) Vault and its types.
 - (e) Methods of seasoning of wood.
 - (f) Bamboo construction.
 - (g) Different types of hinges.
 - (h) Joineries in bamboo.
- II. What is workability of concrete? Explain in detail the applications and uses of Cement concrete in construction. (10)
- OR**
- III. Explain with sketches the classifications of stone masonry. (10)
- IV. Explain the need for seasoning of timber. What are the methods of seasoning of timber? (10)
- OR**
- V. Discuss the application of bamboo in construction industry. Compare the merits and demerits of bamboo over wood as a construction material. (10)

PART B

(2 × 20 = 40)

- VI. Draw to a suitable scale; the plan of alternate courses and elevation of an L-shaped 1 ½ thick wall in Double Flemish bond. (20)
- OR**
- VII. Draw to a suitable scale the elevation and section of a three centered elliptical arch-constructed of brick of 20 cm thick. (20)
- VIII. Draw the following to a suitable scale: (20)
- (i) Dovetail joint.
 - (ii) Tongue and groove joint.
 - (iii) Rebated joint.
 - (iv) Rusticated joint.
- OR**
- IX. Draw to a scale of 1:10; plan, elevation and section of a panelled wooden door for an opening of 100 cm × 210 cm. Label its parts with dimensions. Show fixing details. (20)

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AR 1103 HISTORY OF ARCHITECTURE I (2014 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A (Answer *ALL* questions)

(8 × 5 = 40)

I. Write short notes on the following:

- (a) Catal Huyuk
- (b) Shoji walls
- (c) Temple of Amon at Karnak
- (d) Colosseum
- (e) Dasavthara temple
- (f) Shore temple Mahabalipuram
- (g) Islamic architecture in Kerala
- (h) Koothambalam

PART B

(4 × 15 = 60)

II. 'The sedentary lifestyle, architecture and other arts started to develop during the Jomon period. It was the birth of culture in Japan' – Elaborate

OR

III. Discuss about the factors that influence the architectural character of a place, with reference to any civilization.

IV. 'The Indus Valley civilization offers an excellent example to the modern world in various ways' -Elaborate in terms of its city planning and architecture.

OR

V. Explain in detail the history, evolution and architectural characteristics of Ancient Greek Architecture with relevant examples.

VI. Discuss about the early Chalukyan architecture with reference to suitable examples.

OR

VII. 'Buddhist architecture witnessed the construction of rock-cut caves, monasteries, prayer halls, and shrines' -Elaborate.

VIII. Explain in detail the architectural characteristics of temples in Kerala with suitable example.

OR

IX. 'The Padmanabhapuram palace complex is an exceptional testimony to the traditional architectural knowledge of Kerala' - Elaborate

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B

B.Arch. Degree I & II Semester Examination April 2021

AR 1105 ARCHITECTURAL GRAPHICS I (2014 Scheme)

(One A2 drawing sheet is to be supplied)

Time: 4 Hours

Maximum Marks: 100

(4 × 25 = 100)

I. Compose a two point perspective composition of a market place with trees, houses, human beings etc. Render in pencil with light and shade effect.

OR

II. Make a still life composition with steel glass or utensils. Light, shade and shadow should be maintained.

III. Explain in detail the importance of lines and texture in art.

OR

IV. Create a composition with basic shapes. Any colour medium can be used.

V. Design a multi colour poster for the campaign of "Beti Bachao, Beti Padhao" (Save girl child, educate girl child). Size: A3(29.7 cm × 42 cm). Use any colour medium.

OR

VI. What are the principles of design essential for a great composition? Explain it with illustrative sketches.

VII. Write in detail the contributions of K. C. S. Paniker to Indian Art.

OR

VIII. Briefly explain the contributions of Leonardo da Vinci in the Renaissance period.

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AR 1106 MATHEMATICS

(2014 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A

(Answer ALL questions)

(8 × 5 = 40)

- I. (a) Solve the exact equation $(x^2 + y^2 - a^2)xdx + (x^2 - y^2 - b^2)ydy = 0$.
- (b) Solve the equation $(D^2 + D)y = 2 + e^x$.
- (c) Verify Euler's theorem for the function $u = x^n \sin\left(\frac{y}{x}\right)$.
- (d) Find J and J^* , If $x = r\cos\theta$, $y = r\sin\theta$, $z = z$.
- (e) Prove that the $f(x) = \begin{cases} \frac{1}{18}(3+2x); & 2 \leq x \leq 4 \\ 0 & ; \text{otherwise} \end{cases}$ is a pdf. Find $P(2 \leq x \leq 3)$.
- (f) Find mean and the variance of uniform distribution.
- (g) A sample of 100 items gave a mean 7.4 kg and standard deviation 1.2 kg. Find 95% confidence limit for the population mean.
- (h) Define the following terms:
- (i) Type I error
 - (ii) Type II error
 - (iii) Null Hypothesis
 - (iv) Alternative Hypothesis

PART B

(4 × 15 = 60)

- II. (a) Solve $(1+x)^2 \frac{d^2 y}{dx^2} - (1+x) \frac{dy}{dx} = 4 \cos \log(1+x)$. (7)
- (b) Solve $\frac{dx}{dt} + 2y = \sin(2t)$, $\frac{dy}{dt} - 2x = \cos(2t)$. (8)

OR

- III. (a) Solve the differential equation $y(2xy + e^x)dx = e^x dy$, reducing to Bernoulli's equation. (7)
- (b) Solve $(3x+2)^2 \frac{d^2 y}{dx^2} + 3(3x+2) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$. (8)

(P.T.O)

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- IV. (a) If u is a homogeneous function of degree n in x and y . Show that (7)

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = n(n-1)u.$$

- (b) Examine the function $u = xy(a - x - y)$ for maxima and minima. (8)

OR

- V. (a) Show that of all the rectangular parallelepipeds with given volume, the cube has the least surface area. (7)

- (b) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, Prove that (8)

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

- VI. (a) In partially destroyed sheet of laboratory data, only the equations giving the two lines of regression y on x and x on y are available and are respectively $7x - 16y + 9 = 0$, $5y - 4x - 3 = 0$. Calculate the Coefficient of correlation, \bar{x} , \bar{y} . (7)

- (b) In sampling a large number of parts manufactured by a machine the mean number of defect is in a sample of 20 is 2. Out of 1000 such samples how many would be expected to contain. (8)

- (i) No defective
(ii) Exactly 3 defective
(iii) Not more than 3 defective
(iv) At least 3 defective

OR

- VII. (a) Use the method of least squares to determine a and b in the formula (8)

$y = ax + bx^2$ for the following data:

x	1	2	3	4	5
y	1.8	5.1	8.9	14.1	19.8

- (b) A typist keeps a record of mistakes made per day during 300 working days. Fit the Poisson distribution to the following data and hence calculate the theoretical frequencies. (7)

Mistake/day	0	1	2	3	4	5	6
No. of days	143	90	42	12	9	3	1

- VIII. (a) A machine is expected to produce nails of length 2 cm. A random sample of 25 nails gave an average length 2.1 cm and standard deviation 0.25 cm. Can it be said that the machine is producing nails as per specification. (8)

- (b) The wholesaler in bulbs supplied by him is defective. A random sample of 600 bulbs contained 36 defectives. Test the claim of the whole seller. (7)

OR

- IX. (a) Suppose the following 10 values represent random observations from a normal population, 2, 6, 7, 9, 5, 1, 0, 3, 5, 4. Construct a 99% confidence interval for the mean of the population. (7)

- (b) The mean of two random samples of size 1000 and 2000 are 67.5 and 68 inches respectively. Can the samples be regarded to have been drawn from the same? Population of standard deviation 9.5 inches? Test at 5% level of significance? (8)

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AR 1107 GEOMETRICAL DRAWING (2014 Scheme)

Time : 4 Hours

Maximum Marks : 100

PART A

(Answer *ALL* questions)

(8 × 5 = 40)

- I. Write short notes on:
- (a) Representative fraction
 - (b) Archimedean & Logarithmic spirals
 - (c) First angle and third angle projection
 - (d) Types of parallel projections
 - (e) Platonic solids
 - (f) True shape and apparent shape
 - (g) Isometric projection and isometric view
 - (h) Types of perspective projections

PART B

(4 × 15 = 60)

- II. On a map, a 450 m long line is represented by 30 cm, construct a diagonal scale measuring 300 m and show a distance of 167.5 m on the scale.
- OR**
- III. Two fixed points are 100 mm apart. A point P moves in such a way that the sum of its distances from the fixed points is always a constant and equal to 150 mm. Trace the path of the point and also draw a tangent and a normal at any point on the curve.
- IV. A line AB is 65 mm long with end A 26 mm above HP and 39 mm in front of VP. Draw the projections when AB is inclined at 30° with HP and 45° with VP.
- OR**
- V. A square prism of base 30 mm side and axis 50 mm has its axis inclined at 45° to the ground. It has an edge of base parallel to the ground and inclined at 30° to VP. draw its projection.
- VI. A cylinder of 75 mm diameter standing on its base in HP is completely penetrated by another cylinder of 50 mm diameter, their axes bisecting each other at right angles. Draw the projection showing curve of penetration, assuming axis of the penetrating cylinder to be parallel to V.P.
- OR**
- VII. A vertical chimney of 70 cm diameter joins a roof, sloping at an angle of 45° with the horizontal the shortest portion over the roof is 32 cm. Determine the shape of the sheet metal from which the chimney can be fabricated.
- VIII. 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**
- IX. A pentagonal prism of side 25 mm and length 50 mm is 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 center of block. Draw the perspective of the block.

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AR 1108 MECHANICS OF STRUCTURES (2014 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A (Answer ALL questions)

(8 × 5 = 40)

- I. (a) Explain different system of forces with neat sketch.
- (b) Define coefficient of friction and angle of friction. Establish a relation between them.
- (c) Write note on Parallel axis theorem and Perpendicular axis theorem.
- (d) Explain the classification of truss. What are the assumptions used in the analysis of trusses.
- (e) Draw the shear force and bending moment diagrams of a cantilever beam of length l m carrying a point load of intensity P kN at its mid length.
- (f) Derive the relationship between Loading, Shear force and Bending moment.
- (g) Explain Bulk modulus, Young's modulus and Modulus of rigidity. Explain the relation between them.
- (h) Explain pure bending. Write down the equation for theory of simple bending with explanation of notations.

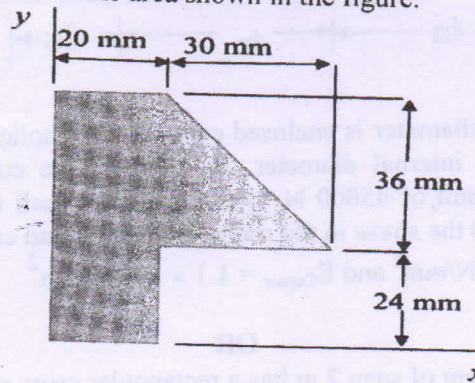
PART B

(4 × 15 = 60)

- II. Find the magnitude and direction of the resultant of the following forces: (i) 20 N inclined at 30° towards North of East (ii) 25 N towards North (iii) 30 N towards North West (iv) 35 N inclined at 40° towards South of West.

OR

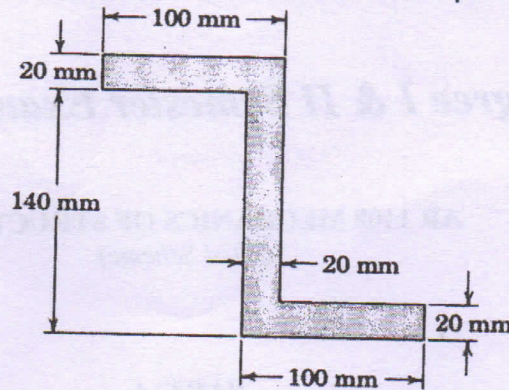
- III. Locate the centroid of the area shown in the figure.



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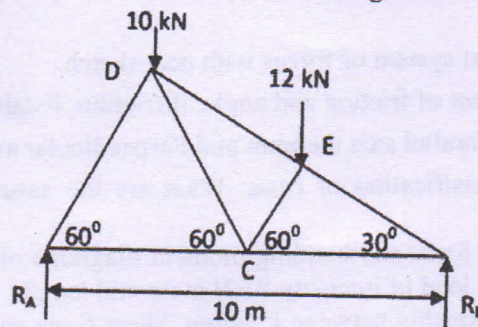
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- IV. Determine the moment of inertia for the I section with respect to X and Y axes.



OR

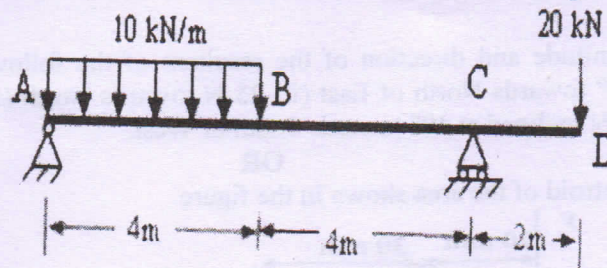
- V. Find the axial forces in all members of the following truss.



- VI. A simply supported beam AB of 5 m span carries a uniformly distributed load of 2 kN/m over the right hand half of the span with a point load of 10 kN at 2.5 m from the left hand support. Draw the shear force and Bending moment diagrams for the above mentioned beam.

OR

- VII. Draw the shear force and Bending moment diagrams for the given overhanging beam.



- VIII. A steel rod of 30 mm diameter is enclosed centrally in a hollow copper tube of external diameter 50 mm and internal diameter of 40 mm. The composite member is then subjected to an axial pull of 45000 N. If the length of each (rod and tube) is equal to 150 mm, determine: (i) the stress in the rod and tube (ii) load carried by the rod and tube. Take $E_{\text{Steel}} = 2.1 \times 10^5 \text{ N/mm}^2$ and $E_{\text{Copper}} = 1.1 \times 10^5 \text{ N/mm}^2$

OR

- IX. A simply supported beam of span 2 m has a rectangular cross section 100 mm \times 150 mm support a UDL of intensity w kN/m over a span of 2 m. If the safe stresses are 28 N/mm^2 in bending and 2 N/mm^2 in shear, calculate the safe intensity of the load which can be supported by the beam.

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B.Arch. Degree I&II Semester Examination April 2021

AR 1109 SURVEYING AND LEVELLING (2014 Scheme)

Time: 3 Hours

Maximum Marks: 100

PART A (Answer *ALL* questions)

(8 × 5 = 40)

- I. (a) Write note on Reciprocal Ranging.
- (b) Which are the accessories to be used in plane table survey? State its uses.
- (c) Differentiate:
 - (i) Transiting and Swinging telescope
 - (ii) Face left and Face right in theodolite survey.
- (d) Compare Bowditch rule and Transit Rule.
- (e) Write in detail about Aerial Photography.
- (f) Differentiate Digital and Auto levels.
- (g) Compare Collimation method and rise and fall method.
- (h) Write any two uses of contour map.

PART B

(4 × 15 = 60)

- II. Explain in detail Obstacles to Chaining. Explain in detail about chaining on uneven or sloping ground with neat figure.
- OR**
- III. Write the procedure to find out the position of station using Bessel's Method for Three point problem with neat figure.
 - IV. Explain with a neat diagram the various parts of a theodolite. Also explain different classification of theodolites.
- OR**
- V. Explain the procedure for measurement of the horizontal angle and the magnetic bearing using a theodolite.
 - VI. Write in detail about GPS. Explain its uses, advantages and disadvantages.
- OR**
- VII. Write in detail about Total Station. Explain its advantages and disadvantages.
 - VIII. Explain briefly the process of Profile levelling and Cross-sectional levelling.
- OR**
- IX. The following consecutive readings were taken with a dumpy level: 3.860, 3.345, 2.930, 1.950, 0.855, 3.798, 2.640, 1.540, 1.985, 0.865, 0.665. The level was shifted after the fifth and eighth readings. The first reading was taken on the BM of RL 120 m. Calculate the reduced levels of all other points and find the level difference between the first and last point.