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B.Arch. Degree I&II Semester Examination April 2018

AR 1101 ARCHITECTURAL DESIGN I (2014 Scheme)

Time: 4 Hours

Maximum Marks: 100

Instructions:

One drawing sheet of approximately A1 size and two butter sheets must be supplied.

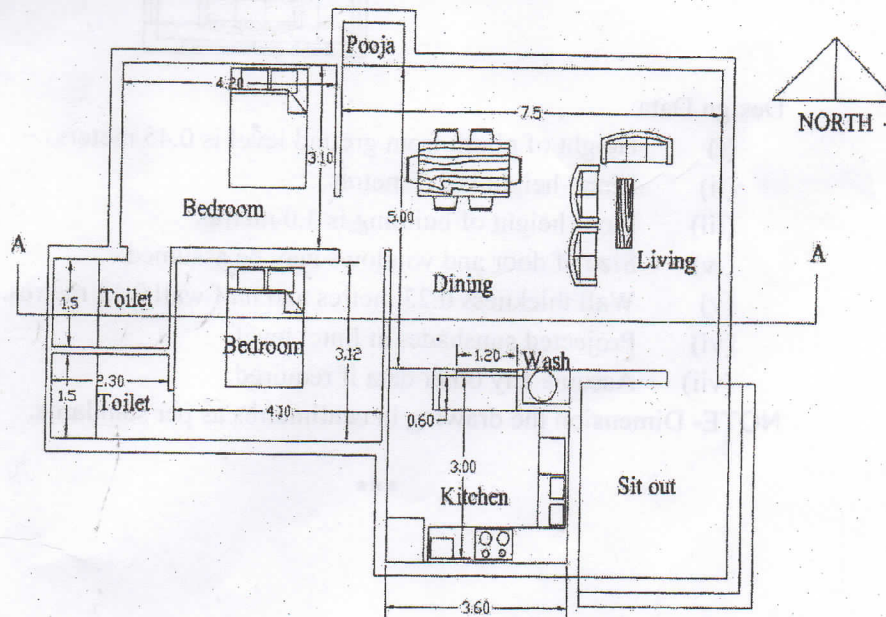
Answer **any one** question in full. Each question carries **100** marks.

The drawing should be properly dimensioned, labelled in good lettering and rendered appropriately.

Due credits will be given to drafting quality, correctness of drawing and conformity with drawing standards.

(1 × 100 = 100)

- I. Prepare a neatly drafted, detailed technical drawing of the building plan given below.
- Floor plan showing plaster thickness and door/window frames in scale 1:50.
 - South side elevation in scale 1:50.
 - Section cut through section line AA in scale 1:50.

**Design Data**

- Height of plinth from ground level is 0.45 metres.
- Lintel height is 2.1 metres.
- Floor height of building is 3.0 metres.
- Size of door and windows may be assumed.
- Wall thickness 0.23 metres and half wall 0.12 metres.
- Projected sunshades at lintel level.
- Assume any other data if required.

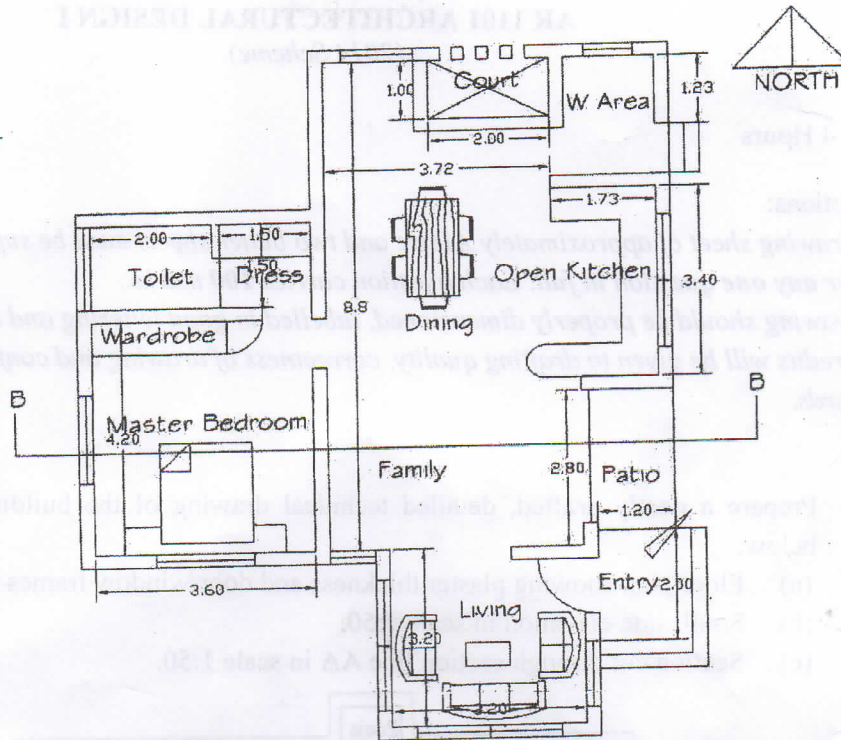
Note- Dimension the drawing in centimetres as per standards.

OR

(P.T.O.)

II. Prepare a neatly drafted, detailed technical drawing of the building plan given below.

- Floor plan showing plaster thickness and door/window frames in scale 1:50.
- South side elevation in scale 1:50.
- Section cut through section line BB in scale 1:50.



Design Data:

- Height of plinth from ground level is 0.45 metres.
- Lintel height is 2.1 metres.
- Floor height of building is 3.0 metres.
- Size of door and windows may be assumed.
- Wall thickness 0.23 metres and half wall 0.12 metres.
- Projected sunshades at lintel level.
- Assume any other data if required.

NOTE- Dimension the drawing in centimetres as per standards.

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B.Arch. Degree I&II Semester Examination April 2018

AR 1102 BUILDING MATERIALS AND CONSTRUCTION I (2014 Scheme)

Time : 4 Hours

Maximum Marks : 100

*(Candidate will be supplied with one drawing sheet approximately of A1 size.
Illustrate answers with sketches wherever necessary.)*

PART A

- I. Write short notes on the following: (8 × 5 = 40)
- (a) Grades of concrete.
 - (b) Mixing proportions of cement mortar for various building applications.
 - (c) Bearing and non load bearing walls.
 - (d) Types of Arches.
 - (e) Methods of seasoning of wood.
 - (f) Bamboo construction.
 - (g) Joinery for wood.
 - (h) Classification of stones.
- II. Describe various aspects of brick masonry and concrete block masonry. (2 × 10 = 20)
- OR**
- III. Explain various aspects of ashlar stone masonry and rubble masonry. (10)
- IV. Mention three types of hard wood commonly used in Kerala for construction of doors and windows, indicating their merits and demerits. (10)
- OR**
- V. List various hardwares available for use for doors and windows in Kerala. Describe their selection criteria. (10)

PART B

- VI. Draw plan of alternate courses of one brick (22.5 cm) thick brick wall corner (Quoin), side elevation and a cross section of the wall in English bond, to a scale of 1:10 (2 × 20 = 40)
- OR**
- VII. Draw plan and cross section of a T-junction of a random rubble stone foundation for a 24 cm thick laterite wall, to a scale of 1:10. Assume size of footing as 60 cm wide and 75 cm deep. Plinth 45 cm wide and 45 cm high. Show damp proofing course, key stone etc. (20)
- VIII. Draw to a scale of 1:10 plan, elevation and section of a wooden panelled door for masonry opening of 100 cm x 210 cm for a residence. Label the drawing fully with dimensions, names and size of parts. Show fixing details. (20)
- OR**
- IX. Draw the following to an appropriate scale: (20)
- (i) Butt joint.
 - (ii) Tongue and groove joint.
 - (iii) Mitred joint.
 - (iv) Dove tailed joint.

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B.Arch. Degree I & II Semester Examination April 2018

AR 1103 HISTORY OF ARCHITECTURE I (2014 Scheme)

Time: 3 Hours

Maximum Marks: 100

(Illustrate your answer with sketches wherever necessary)

PART A (Answer ALL questions)

(8 × 5 = 40)

- I. Write short notes on:
- Jericho city near Jordan river.
 - Ishtar Gate.
 - Great Bath of Mohenjo-Daro.
 - Agora.
 - Durga temple, Aihole.
 - Temple theatre of Kerala.
 - Mastaba.
 - Roman Basilica.

PART B

(4 × 15 = 60)

- II. Greek architecture is known for the perfection of perception of building after finishing. What are the optical correction measures used by the Greek to correct the optical illusions? Explain, in detail, with suitable sketches and examples.
- OR**
- III. What are the salient features of the ancient river valley civilization of Mesopotamia?
- IV. Dravidian architecture attained its refinement during Chola period. Establish the statement narrating suitable examples with sketches.
- OR**
- V. What are the characteristic features of early Chalukyan Temple Architecture at Pattadakal.
- VI. Elaborate on any one of the following early settlements in India:
- Early Harappan.
 - Mehrgarh – Neolithic (6500 BCE to c. 2500 BCE) sites.
- OR**
- VII. The climate and the socio-cultural pattern evolves an architectural characteristic feature to civilization. Verify the statement with respect to any two early prehistoric human settlements you have studied.
- VIII. Roof forms a dominant visual feature of Kerala vernacular architecture. Discuss with suitable sketches and examples.
- OR**
- IX. Explain, in detail, the planning principles involved in the evolution of 'Koothambalam' with reference to the Koothambalam of Vadakkunatha temple at Thrissur.

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B.Arch. Degree I & II Semester Examination April 2018

AR 1105 ARCHITECTURAL GRAPHICS I

(2014 Scheme)

Time : 4 Hours

Maximum Marks : 100

(Candidates will be supplied with one A-2 size handmade drawing sheet.)

(4 × 25 = 100)

- I. How is impressionism different from cubism? Explain how both of these movements influenced art and architecture with suitable examples.
OR
- II. The Russian painter Wassily Kandinsky has influenced architecture and architects through his works. Explain with examples.
- III. Draw a three dimensional composition with varying size of the cubes based on the principles of visual arts, in any suitable colour medium. (Size – A4)
OR
- IV. Draw an interior view of a study room with furniture. Render the perspective with light and shade effect in pencil. (Size – A4)
- V. Design a colour poster to promote ‘Green Building’ movement. (Size A4).
OR
- VI. Sketch a village market scene. Render in pencil with light and shade effect. (Size – A4).
- VII. Explain the principles of visual arts? Give illustrative sketches to explain the principles of composition.
OR
- VIII. Explain the colour theory in visual arts with illustrative examples.

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B.Arch. Degree I & II Semester Examination April 2018

AR 1106 MATHEMATICS (2014 Scheme)

Time: 3 Hours

Maximum Marks: 100

PART A

(Answer ALL questions)

(8 × 5 = 40)

- I. (a) Solve $(y \cos x + 1) dx + \sin x dy = 0$.
- (b) Solve $\frac{dy}{dx} + \frac{x}{1-x^2} y = x\sqrt{y}$.
- (c) If $u = x^y$, show that $\frac{\partial^3 u}{\partial x^2 \partial y} = \frac{\partial^3 u}{\partial x \partial y \partial x}$.
- (d) If $u = x(1-y)$; $v = xy$ prove that $JJ' = 1$.
- (e) The mean and variance of a binomial distribution are 4 and $\frac{16}{5}$ respectively. Find Prob $[X \geq 1]$.
- (f) Find the mean of the random variable X , whose pdf is $f(x) = \lambda e^{-\lambda x}$, $x > 0$.
- (g) Distinguish between point estimation and interval estimation.
- (h) A normal population has a mean of 6.8 and standard deviation of 1.5. A sample of 400 members gave a mean of 6.75. Is the difference significant?

PART B

(4 × 15 = 60)

- II. (a) Solve $\frac{d^3 y}{dx^3} + y = \sin(2x+3)$.
- (b) Solve $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = \log x \sin(\log x)$.

OR

- III. (a) Find a particular integral of $(D^2 - 4D + 3)y = e^x \cos 2x$.
- (b) Solve $\frac{dx}{dt} = 7x - y$; $\frac{dy}{dt} = 2x + 5y$.

(P.T.O.)

IV. (a) If $v = \frac{x^3 y^3}{x^3 + y^3}$, show that $x \frac{\partial v}{\partial x} + y \frac{\partial v}{\partial y} = 3v$.

(b) Examine the function $x^3 + y^3 - 3axy$ for maxima and minima.

OR

V. (a) The period T of a simple pendulum is given by $T = 2\pi \sqrt{l/g}$. Find the maximum error in T due to possible errors upto 1% in l and 2.5% in g .

(b) If $x = r \cos \theta$, $y = r \sin \theta$, prove that $\frac{\partial^2 \theta}{\partial x^2} + \frac{\partial^2 \theta}{\partial y^2} = 0$.

VI. (a) Find the mean of the Poisson distribution.

(b) The lines of regression of two random variables x and y are $8x - 10y + 66 = 0$, $40x - 18y = 214$. Find \bar{x} , \bar{y} and the coefficient of correlation.

OR

VII. (a) A sample of 100 dry battery cells tested for length of life produced the following results. $\bar{x} = 12$ hours and standard deviation 3 hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have length of life

- (i) More than 15 hours?
(ii) Between 10 and 14 hours?

(b) Find the best fitted least square line to the following data.

x :	0	1	2	3	4
y :	3	6	6	8	10

VIII. (a) Find a 95% confidence interval for the mean of a normal population from which a sample of 100 items were chosen, which produced a mean of 15, assuming that $\sigma = 3.5$.

(b) Intelligence tests were given to 121 girls and 81 boys. The following results were obtained.

Girls	Mean = 84	SD = 10
Boys	Mean = 81	SD = 12

Is the difference in mean scores significant?

OR

IX. (a) Explain the following terms.

- (i) Critical region (ii) Null hypothesis and alternate hypothesis
(iii) Type I and Type II errors (iv) Level of significance

(b) In comparing the variability of the tensile strength of two kinds of structural steel, an experiment yielded the following results. $n_1 = 13$, $n_2 = 16$, $s_1^2 = 19.2$, $s_2^2 = 3.5$, where the units of measurements are 1000 pounds per square inch. Assuming that the measurements are samples from two normal populations, test the hypothesis that $\sigma_1^2 = \sigma_2^2$ against the alternative $\sigma_1^2 \neq \sigma_2^2$ at 0.01 level of significance.

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B.Arch. Degree I & II Semester Examination April 2018

AR 1107 GEOMETRICAL DRAWING (2014 Scheme)

Time : 4 Hours

Maximum Marks : 100

(Answer Part B in the drawing sheet provided. Assume suitable scale/data wherever necessary)

PART A

(Answer ALL questions)

(8 × 5 = 40)

- I. (a) Construct a plain scale to show metres, when 1 cm represents 4 m and long enough to measure upto 50 m. Mark 34 m on the scale.
- (b) Define the following terms with respect to conic sections: (i) directrix (ii) focus (iii) eccentricity (iv) abscissa.
- (c) Draw the projections of the following points represented by their x and y coordinates on a common xy line: (i) C (20, 30) (ii) D (-30, 40) (iii) E (-20, -30) (iv) F (20, -30).
- (d) Differentiate between change of position method and auxiliary plane method for drawing projection of solids.
- (e) Explain the methods for finding lines of intersection of surfaces.
- (f) Explain the Gore method of development of a sphere.
- (g) Discuss the construction of an isometric scale.
- (h) Distinguish between visual ray method and vanishing point method of drawing perspective projection.

PART B

(4 × 15 = 60)

(Retain all construction lines)

- II. The foci of an ellipse are 90 mm apart and the minor axis is 65 mm long. Draw the ellipse. Also draw a normal and a tangent at any point on the ellipse.
- OR**
- III. Construct an Archimedian spiral for one and a half convolutions if the initial and final radius vectors are 30 mm and 240 mm respectively. Draw a tangent and a normal to the spiral at any point on it.
 - IV. A line AB 80 mm long makes an angle of 35° with the HP and 45° with the VP. Its mid point is 30 mm above the HP and 25 mm in front of the VP. Draw the projections of the line.

OR

- V. A triangular pyramid, base 50 mm side and axis 70 mm long, is freely suspended from one of the corners of the base. Draw the projections of the pyramid if the top view of the axis makes an angle of 60° with the xy line.

(P.T.O.)

VI.

A cone of base diameter 40 mm and altitude 50 mm rests with its base on HP. It is cut by a section plane inclined at 55° to HP and perpendicular to VP, meeting the axis at 23 mm from the base. Draw the sectional plan and true shape of the section.

OR

VII.

A sugar jar is in the form of a right circular cone of base diameter 60 mm and height 90 mm and it rests on HP. An ant starts moving from extreme left of its base and returns to its starting point after moving around it. Find geometrically the length of the shortest path the ant can take. Show this path in both the front and the top views.

VIII.

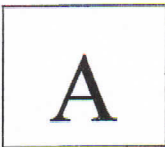
Draw the isometric view of a pentagonal pyramid, side of base 40 mm and height 80 mm resting with its base centrally on a cylinder of diameter 120 mm and height 40 mm.

OR

IX.

A square prism of base 30 mm and height 50 mm rests on the ground plane (GP) with edges equally inclined to the picture plane (PP). The corner nearest to PP is 30 mm to the right of the station point and 20 mm behind the PP. The station point is 65 mm above GP and 80 mm in front of PP. Draw the perspective view of the square prism.

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B.Arch. Degree I & II Semester Examination April 2018

**AR 1108 MECHANICS OF STRUCTURES
(2014 Scheme)**

Time : 3 Hours

Maximum Marks : 100

**PART A
(Answer ALL questions)**

(8 × 5 = 40)

- I. (a) Explain system of forces and triangular law of forces.
- (b) Explain dry friction, fluid friction, static and dynamic friction.
- (c) Explain principal axis and principal moment of inertia.
- (d) Describe the method of analysis of trusses by sections.
- (e) Draw the shear force and bending moment diagrams of a cantilever beam subjected to couple moment at free end.
- (f) Draw SFD and BMD of a simply supported beam carrying uniformly varied load.
- (g) Explain factor of safety and principle of super position.
- (h) Explain in detail bending stress and shear stress.

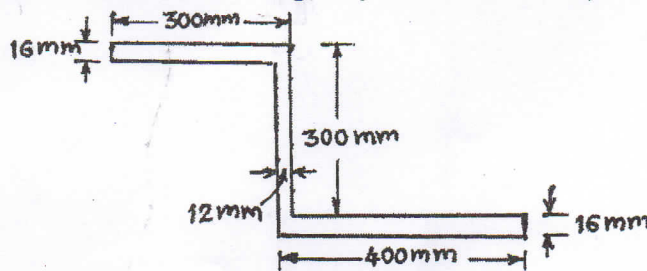
PART B

(4 × 15 = 60)

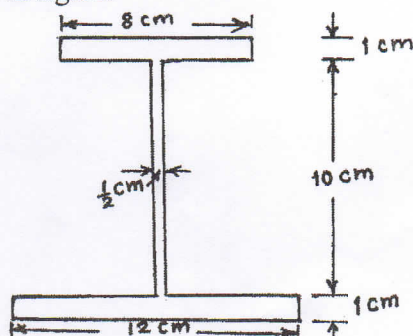
- II. The resultant of two forces is 10 N and it is inclined at 60° to one of the forces whose magnitude is 5 N. Find the magnitude and direction of the other force.

OR

- III. Determine the centre of gravity of the section shown in figure.



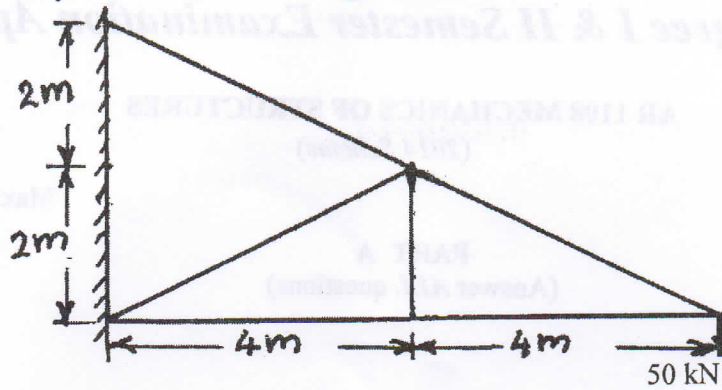
- IV. Determine moment of inertia about the centroidal XX and YY axes of the section shown in figure.



OR

(P.T.O.)

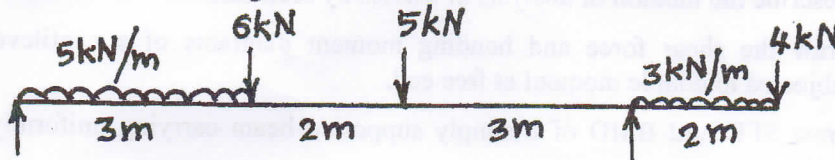
- V. Analyse the truss shown in figure and find the forces in all the members.



- VI. Draw the SFD and BMD of a simply supported beam of span 6 m carrying u.d.l. of 10 kN/m for the entire span with point load of 20 kN at 2 m from left end.

OR

- VII. Draw the shear force and bending moment diagrams for the overhanging beam loaded as shown in figure.



- VIII. A material has modulus of rigidity 4×10^4 N/mm² and bulk modulus 8×10^4 N/mm². Find modulus of elasticity and Poisson's ratio.

OR

- IX. A cantilever beam of span 4m has a rectangular cross section 100 mm \times 200 mm. Find the uniformly distributed load it can carry, if the maximum bending and shear stresses are limited to 10 N/mm² and 1 N/mm² respectively.

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B.Arch. Degree I & II Semester Examination April 2018

AR 1109 SURVEYING AND LEVELLING (2014 Scheme)

Time: 3 Hours

Maximum Marks: 100

PART A (Answer ALL questions)

(8 × 5 = 40)

- I. (a) Explain briefly the principles of surveying.
- (b) State the advantages and disadvantages of plane table surveying.
- (c) What errors are eliminated by adopting 'repetition method' in theodolite surveying? Explain.
- (d) Discuss in brief the 'closing error' in traverse surveying. How is it adjusted graphically?
- (e) List the precautions to be taken while using a total station.
- (f) What are the advantages of aerial photography? Explain.
- (g) Discuss briefly 'differential levelling'.
- (h) Write short note on 'contour map characteristics'.

PART B

(4 × 15 = 60)

- II. In chaining a line, you come across (i) a river (ii) a hill and (iii) a tall building. Describe how you would continue the line with the chain only.
OR
- III. What is meant by three point problem? How is it solved by (i) mechanical method (ii) graphical method?
- IV. What are the various sources of errors in theodolite surveying? Explain.
OR
- V. Describe the various methods of traversing with a theodolite.
- VI. Explain the different photographic devices used for aerial photography.
OR
- VII. Discuss the job planning required to carry out a topographic survey using a total station.
- VIII. Explain briefly the process of:
 - (i) Profile leveling.
 - (ii) Cross-sectioning.**OR**
- IX. The following consecutive readings were taken with a dumpy level:
3.865, 3.345, 2.930, 1.950, 0.850, 3.795, 2.635, 1.545, 1.935, 0.865, 0.665 m.
The level was shifted after the fifth and eighth readings. The first reading was taken on the bench mark of RL 150.250m. Calculate the reduced level of all points and find the level difference between the first and last points.