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B.Arch. Degree I & II Semester Examination June 2015

AR 1101 ARCHITECTURAL DESIGN I

(2014 scheme)

Time : 4 Hours

Maximum Marks : 100

Instructions:

1. One drawing sheet of Approximate A1 size and two rough tracing butter sheets must be supplied.
2. Answer any one question in full. Each full question carries 100 marks.
3. Drawing should be dimensioned as per standards, labeled in good lettering and rendered appropriately.
4. Importance will be given to drafting quality, correctness of drawing and for conformity with standard design and drafting principles.
5. Drawing may be rendered as per architectural standards.

I. Prepare a neatly drafted, detailed technical drawing of a residence; key plan is given in fig.1. Minor variation in plan is permissible, if necessary.

- (a) Floor plan showing dimensions, plastering, details of doors, windows, furniture and equipment lay out etc. appropriate to 1:50 scale. (60)
- (b) Front elevation scale 1:50 (20)
- (c) Cross section through section line marked as A-A. (20)

Design Data

- (1) Plinth height 45 cm
- (2) Wall height 300 cm
- (3) Foundation and basement : RR in C.M.
- (4) Walls 20 cm thick brick
- (5) Roof 10 cm thick plain R.C.C.
- (6) Lintel height 210 cm
- (7) Position and size of doors, windows and ventilators may be fixed as per design principles.
- (8) All other data, if required, may be assumed (refer fig 1 attached).

OR

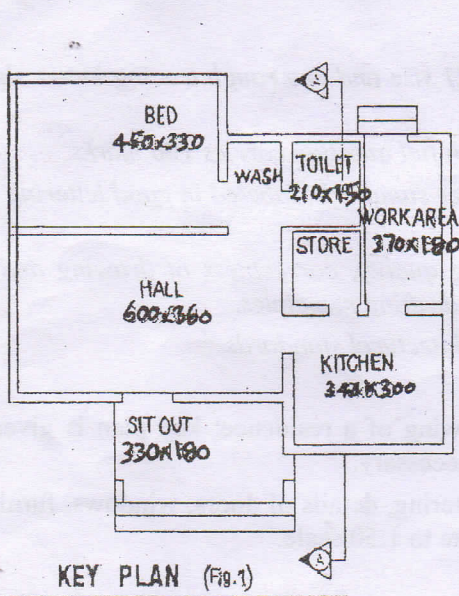
II. Prepare a neatly drafted, detailed technical drawing of a residence, key plan is given in fig.2. Minor variation in plan is permissible, if necessary.

- (a) Floor plan showing dimensions, plastering, details of doors, windows, furniture and equipment lay out etc. appropriate to 1:50 scale. (60)
- (b) Front elevation scale 1:50 (20)
- (c) Cross section through section line marked as B-B. (20)

(P.T.O.)

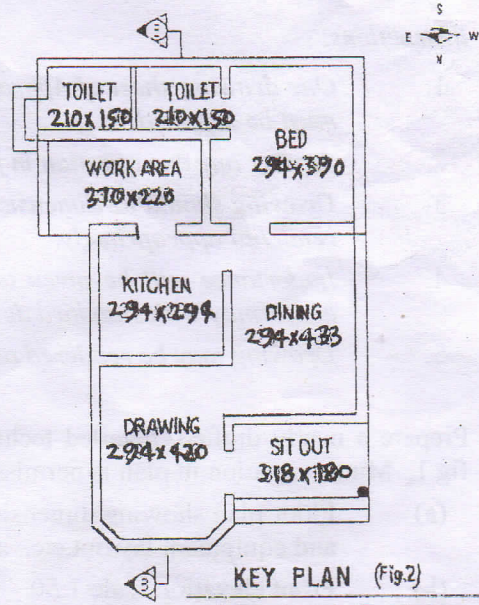
Design data

- (1) Plinth height 45 cm
- (2) Wall height 300 cm
- (3) Foundation and basement : RR in C.M.
- (4) Walls 24 cm thick laterite stone
- (5) Roof 10 cm thick R.C.C.slab
- (6) Lintel height 210 cm
- (7) Position and size of doors, windows and ventilators may be fixed as per design principles.
- (8) All other data, if required, may be assumed (refer fig. 2 attached).



DIMENSIONS NOT TO SCALE

Fig.1



DIMENSIONS NOT TO SCALE

Fig. 2

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B. Arch. Degree I & II Semester Examination June 2015

AR 1102 BUILDING MATERIALS AND CONSTRUCTION I (2014 Scheme)

Time: 4 Hours

Maximum Marks: 100

(One drawing sheet is to be supplied. Illustrate all answers with neat sketches)

PART A

(Answer ALL questions of Qn. No. I)

(8 × 5 = 40)

I. Write short notes on the following:

- Adobe construction.
- Terracotta.
- Grades of cement concrete.
- Alternative materials for brick and stone.
- Brick vaults.
- Defects in timber.
- Types of bamboo.
- Joints in bamboo.

II. Explain in detail classification of stone suitable for construction. (10)

OR

III. Explain in detail the different ingredients in cement concrete and its role in imparting strength. (10)

IV. Explain the various methods of seasoning of timber. (10)

OR

V. Compare and contrast bamboo and timber as building materials. (10)

PART B

VI. Draw to a suitable scale the plan of odd and even courses, section and elevation of two consecutive courses of 1 ½ thick in T-section of a brick wall in English bond. (20)

OR

VII. Draw to a suitable scale plan of odd and even courses, section and elevation of two consecutive courses of 1 brick wall in Rat-trap bond. (20)

VIII. Draw to a suitable scale the plan, elevation, section of a wooden framed glazed window to fit an opening of size 150 cm × 150 cm. Label the parts and their sizes. (20)

OR

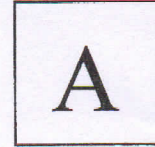
IX. Draw in 1:10 scale the following wooden joints and label the parts and their sizes. (20)

- Double butt-bent joint
- Mitred joint
- Tongue and groove joint
- Dove tailed joint

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B.Arch. Degree I & II Semester Examination June 2015

AR 1103 HISTORY OF ARCHITECTURE I (2014 Scheme)

Time : 3 Hours

Maximum Marks : 100

(Illustrate all answers with sketches)

PART A (Answer ALL questions)

(8 × 5 = 40)

- I. Write short notes on the following:
- Catal huyuk.
 - Mehrgarh
 - Pantheon
 - Great Bath of Harappan Civilization
 - Sanchi Stupa
 - Durga temple
 - Padmanabhapuram Palace
 - Vadakkumnathan temple

PART B

(4 × 15 = 60)

- II. Describe with sketches the early Harappan settlements.
- OR
- III. Discuss with sketches the housing types of Jomon culture.
- IV. Discuss with sketches the evolution of tomb architecture of the Egyptians.
- OR
- V. 'The Roman architecture is known more for its engineering skills than architecture'. Discuss this statement, taking examples.
- VI. Discuss the development and contributions of Buddhist architecture, taking examples from each type.
- OR
- VII. Discuss the evolution of temple architecture in South India, through ages.
- VIII. Describe the factors that influenced the form of Kerala architecture, from climatic point of view.
- OR
- IX. Discuss, how vernacular Christian churches of Kerala are different from that of the West.

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B

B. Arch. Degree I & II Semester Examination June 2015

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)

*(All questions carry **EQUAL** marks)*

(4 × 25 = 100)

I. Write an essay on the contribution of Kanayi Kunjiraman in the field of environmental sculpture.

OR

II. Describe in detail the importance of colour and perspective in art.

III. Draw the bird's eye view of a shopping complex with vehicles and human beings and colour rendering of the same.

OR

IV. Make a still life composition with flower vase and fruit basket arranged on a table. Use any colour medium. Qualities such as light and shade, balance and harmony etc. should be maintained.

V. Design a multi colour poster for the campaign of "Clean city". Size of the poster is 22 cm × 18 cm. Use any colour medium.

OR

VI. Make a one point perspective composition of a landscape with trees, plants, animals etc. Render in pencil with light and shade effect.

VII. Create the dark values and light values of cool and warm colours. Specify them with explanation.

OR

VIII. Draw the interior space of a theatre for performing art with performers. Details of lighting, furniture and spectators should be shown.

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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 $(x^2 - ay)dx = (ax - y^2)dy$.
- (b) Solve the equation $(D^2 - 4D + 4)y = e^{2x}$
- (c) If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$, $x \neq y$ prove that $x \frac{du}{dx} + y \frac{du}{dy} = \sin 2u$.
- (d) If $x = r \cos \theta$ and $y = r \sin \theta$, find J and J^* .
- (e) If x follows Poisson distribution with $P(1) = P(2)$, find mean of the distribution and $P(4)$.
- (f) Find the mean and variance of uniform distribution.
- (g) A sample of 50 items taken from a population with S.D. 16 gave a mean 52.5. Find a 95% confidence interval of the population mean.
- (h) Define the following terms:
(i) Type I error (ii) Type II error
(iii) Power of a test

PART B

(4 × 15 = 60)

- II. (a) Solve $(D^2 - 4D + 3)y = x^2 + \sin 3x$. (7)
- (b) Solve the simultaneous equation (8)
 $Dx + y = \sin t$
 $x + Dy = \cos t$
 given that $x = 2$ and $y = 0$ at $t = 0$.

OR

- III. (a) Solve $x^2 \frac{d^2 y}{dx^2} + 4x \frac{dy}{dx} + 2y = \log x$. (7)
- (b) Solve the equation $\frac{xdy}{dx} + y = x^3 y^6$, reducing to Bernoulli's equation. (8)

- IV. (a) If $u = \frac{1}{\sqrt{x^2 + y^2 + z^2}}$ prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$. (7)
- (b) The dimensions of a cone are radius 5 cm and height 8 cm. What is the error in the calculated volume if the scale used in taking the measurement is short by 0.01 cm per cm. (8)

OR

(P.T.O.)

V. (a) State Euler's theorem on homogeneous functions. Verify the theorem for the function $f = ax^2 + 2hxy + by^2$. (7)

(b) A rectangular box open at the top is to have volume 32 cubic feet. Find the dimensions of the box requiring least material for its construction. (8)

VI. (a) If the probability of a new born child is male in a typical family is 0.6, find the probability that in a family of 5 children, there are (i) exactly 3 boys (ii) majority of girls. (7)

(b) Fit a parabola of the form $y = a + bx^2$ to the following data (8)

x	:	1	2	3	4	5
y	:	0.43	0.83	1.4	2.33	3.42

OR

VII. (a) In a test on 2000 electric bulbs, it was found that the life of a particular make was normally distributed with an average of 2040 hours and S.D of 60 hours. Estimate the number of bulbs likely to burn for (7)

- (i) more than 2150 hours
- (ii) less than 1950 hours
- (iii) more than 1920 hours but less than 2160 hours.

(b) From the following data obtain the two regression equations. (8)

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

VIII. (a) A machine is expected to produce nails of length 2 cm. A random sample of 15 nails gave an average length 2.1 cm and S.D. 0.25 cm. Can it be said that the machine is producing nails as per specification? (7)

(b) It is desired to determine whether there is less variability in the silver plating done by company I than that done by company II. If independent random samples of size 12 of two companies' work yield $S_1 = 0.035$ and $S_2 = 0.062$ test the null hypothesis $\sigma_1^2 = \sigma_2^2$ against the alternative hypothesis $\sigma_1^2 < \sigma_2^2$ at 0.05 level of significance. (8)

OR

IX. (a) Given the following data of two distributions (7)

	Mean	S.D.	Size of sample
A	100	12	80
B	95	10	70

Test whether the difference between the sample mean is significant.

(b) The height of six randomly chosen sailors are in inches 63, 65, 58, 69, 71 and 72. The heights of 10 randomly chosen soldiers are in inches 61, 62, 65, 66, 69, 69, 70, 71, 72 and 73. Do these figures indicate that soldiers are on an average shorter than sailors? Test at 5% level of significance. (8)

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B. Arch Degree I & II Semester Examination June 2015

AR 1107 GEOMETRICAL DRAWING (2014 Scheme)

Time: 4 Hours

Maximum Marks: 100

- (1) Answer Part-A in the answer book provided.
- (2) Answer Part-B in the drawing sheet provided..
- (3) Assume suitable scale/data wherever necessary.

PART A (Answer ALL questions)

(8 × 5 = 40)

- I.
- (a) Explain the principle of diagonal scale.
 - (b) Define a parabola. Draw a parabola and mark:
 - (i) directrix
 - (ii) focus
 - (iii) latus rectum
 - (iv) vertex.
 - (c) Draw the projections of the following points on a common xy line:
 - (i) Point A 15 mm below HP and 35 mm in front of VP.
 - (ii) Point B on HP and 35 mm behind VP.
 - (d) What are platonic solids?
 - (e) Differentiate between true and apparent shape of a section.
 - (f) Explain various methods of drawing development of surfaces.
 - (g) Differentiate between isometric view and isometric projection.
 - (h) Define the following terms related to perspective projection:
 - (i) Station point
 - (ii) Picture plane
 - (iii) Horizon plane
 - (iv) Axis of vision

PART B

(4 × 15 = 60)

(Retain all construction lines)

- II. 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 150mm. Trace the path of the point. Also draw a tangent at any point on the curve.
- OR
- III. In a logarithmic spiral, the shortest radius is 40 mm and the length of adjacent radius vectors enclosing 30° are in the ratio 9:8. Construct the spiral for 1 convolution.
- IV. The top view of a 75 mm long line CD measures 50 mm. C is 50 mm in front of VP and 15 mm below HP. D is 15 mm in front of VP and is above HP. Draw the front view of CD and find its inclination with HP and VP.
- OR
- V. A pentagonal pyramid, base 25 mm side and axis 50 mm long has one of its triangular faces in VP and the edge of the base contained by that face makes an angle of 30° with HP. Draw the projections.
- VI. A right regular hexagonal pyramid edge of base 30 mm and height 75 mm is resting on its base on HP such that two of its base edges are parallel to VP. It is cut by a section plane inclined at 30° to HP bisecting the axis and perpendicular to VP. Draw the elevation, sectional plan and true shape of section.

OR

(P.T.O.)

VII. A cone of base diameter 100 mm and height 130 mm rests with its base on HP. It is cut by a section plane inclined at 30° to HP and perpendicular to VP. Draw the development of the truncated cone if the section plane bisects the axis of the cone.

VIII. A sphere of radius 20 mm is kept on the top face of a square prism of base side 40 mm and height 20 mm. The latter is placed on the top face of a cylinder of 65 mm diameter and 25 mm height. All these solids have a common axis. Draw the isometric projection of the combination of solids.

OR

IX. Draw the perspective view of a rectangular prism of $60 \text{ mm} \times 30 \text{ mm} \times 20 \text{ mm}$ size lying on its $60 \text{ mm} \times 30 \text{ mm}$ rectangular face on the ground plane (GP) with a vertical edge touching the picture plane (PP) and faces inclined at 45° to PP. The station point is 80 mm above GP, 120 mm in front of PP and lies in a central plane which is passing through the centre of the prism.

B. Arch. Degree I & II Semester Examination June 2015

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 systems of forces with sketches.
- (b) Explain limiting friction and cone of friction.
- (c) State and explain parallel axis and perpendicular axis theorems.
- (d) Explain principal axis and principal moment of inertia.
- (e) Draw the SFD and BMD of a cantilever beam subjected to point load at free end and u.d.l. for the entire span.
- (f) What is point of contraflexure? Illustrate with sketches.
- (g) Explain elastic constants and the relationship among them.
- (h) What are the assumption in theory of simple bending?

PART B

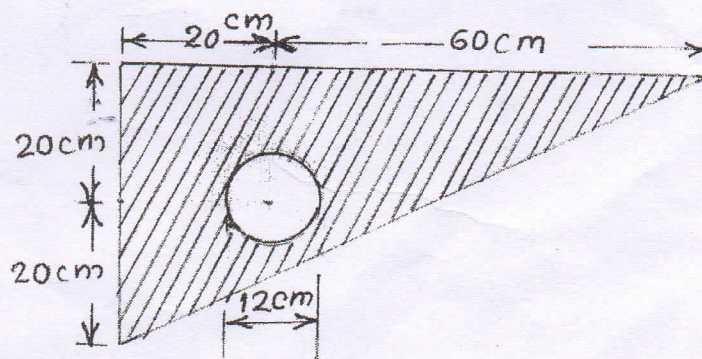
(4 × 15 = 60)

- II. The forces 10 N, 20 N, 30 N, 40 N and 50 N are acting on one of the angular points of a regular hexagon, towards the other five angular points, taken in order. Find the magnitude and direction of the resultant.

OR

- III. A body consisting of a cone and a hemisphere of radius 'r' fixed on the same base rests on a table, the hemisphere being in contact with the table. Find the greatest height of the cone, so that the combined body may stand upright.

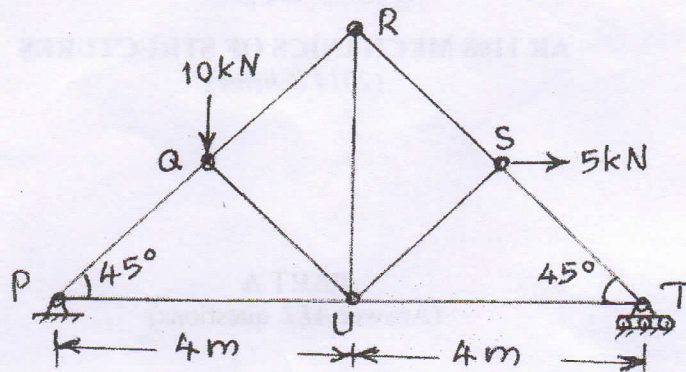
- IV. Determine moment of inertia of the shaded area with respect to centroidal axes.



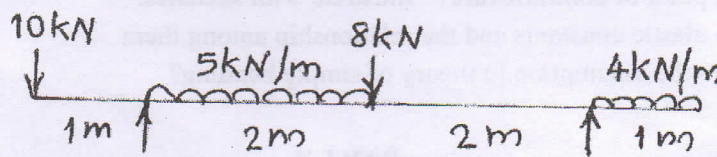
OR

(P.T.O.)

- V. Determine the forces in the members RS, SU and UT of the truss loaded as shown in figure by the method of sections.



- VI. Draw the SFD and BMD of a simply supported beam of span 10 m carries u.d.l. of 5 kN/m for the left half span.
- OR
- VII. Draw SFD and BMD of the overhanging beam loaded as shown in figure.



- VIII. A weight of 250 kN is supported by three short pillars each of 600 mm^2 in cross-section. The central pillar is of steel and outer pillars are of copper. The pillars are so adjusted that at a temperature of 20°C each pillar carries equal load. If the temperature is raised to 120°C , compute the stresses induced. $E_s = 200 \text{ GPa}$, $E_c = 80 \text{ GPa}$, $\alpha_s = 12 \times 10^{-6} / ^\circ\text{C}$ and $\alpha_c = 18 \times 10^{-6} / ^\circ\text{C}$.

OR

- IX. Two beams are simply supported over the same span and have the same flexural strength. Compare the weights of these two beams, if one of them is solid and the other is hollow circular with internal diameter half the external diameter.

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B.Arch. Degree I & II Semester Examination June 2015

AR 1109 SURVEYING AND LEVELLING (2014 scheme)

Time : 3 Hours

Maximum Marks : 100

PART A (Answer *ALL* questions)

(8 × 5 = 40)

- I. (a) What are the different types of surveying?
 (b) Explain reciprocal ranging.
 (c) Elucidate the obstructions in chaining.
 (d) Write note on booking field notes.
 (e) Draw a neat sketch of a theodolite and mark its parts.
 (f) What are the advantages of auto level?
 (g) What are the different types of errors in chaining?
 (h) Define R.L. and B.M.

PART B

(4 × 15 = 60)

- II. Explain the different instruments used in chain survey with neat sketches.

OR

- III. Explain the methods of plane table survey.

- IV. What are the temporary adjustments of theodolite? Explain each.

OR

- V. Write in detail about the following instruments :
 (i) Total station (ii) GPS

- VI. Draw a neat sketch of dumpy level and explain its parts.

OR

- VII. The following readings were taken with a dumpy level the instrument was shifted after taking fourth and eighth reading. Rule out a page of level field book and enter the readings. Also calculate the reduced levels of each station. Use line of collimation method. Assume the initial R.L. as 100 m
 0.500, 2.100, 2.800, 2.900, 1.000, 1.550, 2.350, 3.850, 0.950, 2.300, 2.000

- VIII. What are the characteristics and uses of contour?

OR

- IX. Explain with the help of sketches various steps involved in leveling for longitudinal and cross sections.
