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B.Arch. Degree I & II Semester Examination May 2016

AR 1101 ARCHITECTURAL DESIGN I (2014 Scheme)

Time : 4 Hours

Maximum Marks : 100

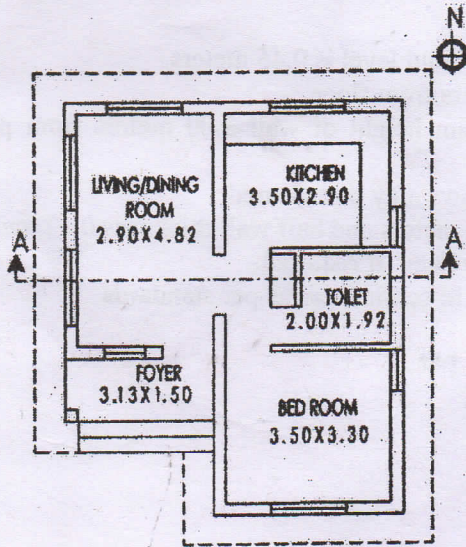
Instructions:

- (i) One drawing sheet (A1 size) and two butter sheets must be supplied.
- (ii) The drawing should be properly dimensioned, labeled in good lettering and rendered appropriately.
- (iii) Importance will be given to drafting quality, correctness of drawing and conformity with drafting standards.

(1 × 100 = 100)

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

- (a) Floor plan with plastering and door/window frames showing furniture layout in scale 1:50.
- (b) South side elevation in scale 1:50.
- (c) Section through the section line A-A. in Scale 1:50.



Design Data

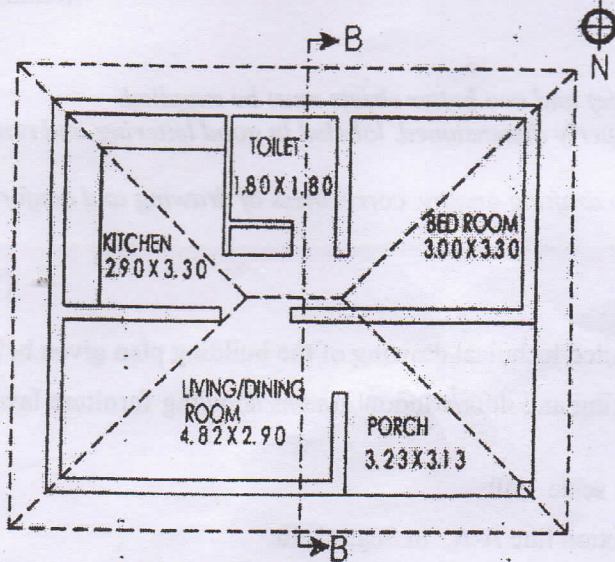
- (i) Height of plinth from ground level is 0.45 meters.
- (ii) Lintel height is 2.1 meters from floor.
- (iii) Floor to floor height of building is 3.0 meters.
- (iv) Size of doors and windows may be assumed.
- (v) Full wall thickness 0.23 meters and half wall thickness 0.12 meters.
- (vi) Projected sunshades at lintel level.
- (vii) Assume other necessary data, if required.
- (viii) Dimension the drawing in centimeters as per standards.

OR

(P.T.O.)

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

- Floor plan with plastering and door/window frames showing furniture layout in scale 1:50.
- North side elevation in scale 1:50.
- Section through the section line B-B, in scale 1:50.



Design data

- Height of plinth from ground level is 0.45 meters.
- Lintel height is 2.1 meters from floor.
- Pitched roof of minimum height of wall 3.00 meters from plinth level.
- Size of doors and windows may be assumed.
- Full wall thickness 0.23 meters and half wall thickness 0.12 meters.
- Assume other necessary data, if required.
- Dimension the drawing in centimeters as per standards

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B. Arch. Degree I & II Semester Examination May 2016

AR 1102 BUILDING MATERIALS AND CONSTRUCTION I

(2014 Scheme)

Time: 4 Hours

Maximum Marks: 100

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

PART A

(8 × 5 = 40)

- I. Write short notes on the following.
- Manufacturing of bricks.
 - Grades of concrete.
 - Flemish bond.
 - Ashlar masonry.
 - Hardwoods and softwoods.
 - Preservation of bamboo.
 - Different types of hinges.
 - Paneled doors.
- II. How are rocks classified? Which are the common defects seen in stones? (10)
Which are the different types of dressing for stones?
- OR**
- III. What is mortar? What are the ingredients of mortar? What are the suitable proportions of mortar used for different types of construction? (10)
- IV. Which are the common defects in timber? Why is seasoning required for timber? Which are the methods for seasoning timber? (10)
- OR**
- V. Why do we consider bamboo as a sustainable building material? Suggest areas where bamboo can be used in the construction of a house. (10)

PART B

(Assume suitable details and dimensions wherever necessary)

- VI. Draw to suitable scale the plans of odd and even courses of one brick wall in English bond and Flemish bond. (20)
- OR**
- VII. Draw to a suitable scale the elevation of a pointed brick arch of span 120 cm and rise 90 cm. Indicate the important parts of the arch. (20)
- VIII. Draw to a suitable scale the plan, elevation and section of a glazed window for an opening of size 1.2 m × 1.5 m. Name the parts and indicate the size of each member. (20)
- OR**
- IX. Draw to scale the following. (20)
- Mortise and Tenon joint.
 - Lap joint.
 - Butt joint.
 - Tongue and groove joint.

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B.Arch. Degree I & II Semester Examination May 2016

AR 1103 HISTORY OF ARCHITECTURE I (2014 Scheme)

Time : 3 Hours

Maximum Marks : 100

(Illustrate all answers with neat sketches. Sketches will be duly credited)

PART A (Answer ALL questions)

(8 × 5 = 40)

- I. Write short notes on the following.
- (a) Architectural and site planning features of Catal Huyuk.
 - (b) Archaeological significance of Mehrgarh site.
 - (c) Features of the great bath of Mohenjodaro.
 - (d) Architectural significance of Mastabas.
 - (e) Sculptural quality of Panch Rathas.
 - (f) Architecture of Chaitya Hall at Karli.
 - (g) Nadumuttam and its social/cultural implication.
 - (h) Namaskara Mandapam.

PART B

(4 × 15 = 60)

- II. Give a brief account of *Jomon* culture citing the architectural significance that the culture has left behind.
- OR**
- III. Explain how the factors of geography, climate, social and culture influence architecture, citing an example of your choice.
- IV. Enumerate the distinct architectural characteristics of the Pyramid of Giza.
- OR**
- V. Compare and contrast the features of Doric, Ionic and Corinthian orders.
- VI. Give a brief account of the city planning principles adopted in later vedic period.
- OR**
- VII. Narrate the essential features of *Pallava* architecture citing a suitable example.
- VIII. The traditional *chaturshala (nalukettu)* of Kerala is often considered as a Hindu cosmos. Substantiate the statement citing the architectural planning principles and features found in a typical *nalukettu* of Kerala.
- OR**
- IX. Explain the typical features of a temple in Kerala with reference to *Vadakkumnathan* temple in Thrissur. Also enumerate the terminologies associated with a typical *pancha prakara* temple of Kerala.

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B.Arch. Degree I & II Semester Examination May 2016

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. Write the importance and contributions of Artist Raja Ravi Varma as a pioneer of Indian Modern Art. Indicate his two most important works.

OR

II. Briefly explain the contributions of Rembrandt in the Baroque period which Art Historians call the Dutch Golden Age.

III. Draw a streetscape which includes human figures and buildings etc. Render in any medium.

OR

IV. Sketch a two dimensional creative composition by means of the fundamental geometrical forms similar to square, circle and triangle.

V. Design a poster based on the reactions of 'Non-Organic Insecticide' within the size specification of 20 cm × 30 cm.

OR

VI. Explain the colour theory and colour principles with adequate sketches which comprise of colour combination or scheme.

VII. Draw a three dimensional composition space based on fundamentals of visual arts like line, form, shape, space, colour, value, texture, perspective and harmony etc.

OR

VIII. Create an imaginative interior-space composition which includes the utensils, furniture, plants, hangings, paintings, sculptures and human figure. Render in pencil.



B. Arch. Degree I & II Semester Examination May 2016

AR 1106 MATHEMATICS (2014 Scheme)

Time: 3 Hours

Maximum Marks: 100

PART A

(8 × 5 = 40)

- I. (a) Solve $(3x^2 + 6xy^2)dx + (6x^2y + 4y^3)dy = 0$.
- (b) Solve $(\sqrt{xy} - x)dy + ydx = 0$.
- (c) Evaluate $\frac{\partial(r, \theta)}{\partial(x, y)}$, if $r = \sqrt{x^2 + y^2}$ and $\theta = \tan^{-1}\left(\frac{y}{x}\right)$.
- (d) If $u = e^x(x \cos y - y \sin y)$, prove that $u_{xx} + u_{yy} = 0$.
- (e) Find the value k for which $f(x) = \begin{cases} kx(1-x) & 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$ is a probability density function. Find the mean and SD.
- (f) If X is uniformly distributed random variable with mean 1 and variance $\frac{4}{3}$, find $P(X < 0)$.
- (g) A random sample of 25 items with mean 20 is drawn from a population with standard deviation 10. Find 95% confidence interval of the population mean.
- (h) Define the following terms: (i) Null hypothesis (ii) Alternate hypothesis (iii) Type I error and (iv) Type II error.

PART B

(4 × 15 = 60)

- II. (a) Solve $(D^2 + 4)y = x^2 + \cos 2x$. (7)
- (b) Solve $\frac{dx}{dt} + 2x - 3y = 0$ & $\frac{dy}{dt} - 3x + 2y = 0$ (8)
- OR
- III. (a) Solve $x^3 \frac{d^2y}{dx^2} + 3x^2 \frac{dy}{dx} - xy = \sin(\log x)$. (7)
- (b) Solve $\frac{dy}{dx} + \frac{x}{1-x^2}y = x\sqrt{y}$. (8)
- IV. (a) If $u = \sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$, prove that $x^2u_{xx} + 2xyu_{xy} + y^2u_{yy} = \tan^3 u$. (7)
- (b) Find the minimum value of $x^2 + y^2 + z^2$ when $x + y + z = 3a$. (8)

OR

(P.T.O.)

- V. (a) If $u = \log(\tan x + \tan y + \tan z)$, prove that $\sin 2x \frac{\partial u}{\partial y} + \sin 2y \frac{\partial u}{\partial z} + \sin 2z \frac{\partial u}{\partial x} = 2$ (7)
- (b) The torsional rigidity of a length of a wire is obtained from the formula (8)
 $N = \frac{8\pi IL}{T^2 R^4}$. If L is decreased by 2%, R is increased by 2%, T is increased by 1.5%. Show that the value of N is diminished by 13% approximately.

- VI. (a) In a lot of 500 solenoids, 25 are defective. Find the probabilities of a sample of 20 solenoids chosen at random may have (i) no defectives (ii) two defectives (iii) not more than 2 defectives (iv) 2 or 3 defectives. (7)
- (b) Find the coefficient of correlation and the two regression line equations from the following data. (8)

X :	20	22	25	26	27	23
Y :	31	29	32	37	35	34

OR

- VII. (a) Use the principle of least squares; fit a straight line to the following data. Find Y when X = 1986. (7)

X :	1941	1951	1961	1971	1981
Y :	8	10	12	10	16

- (b) In a normal distribution, 5% of the items are under 60 and 40% are between 60 and 65. Find the mean and standard deviation of the distribution. (8)
- VIII. (a) Ten individuals are chosen at random from a normal distribution of students and their marks found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. In the light of these data, discuss the suggestion that the mean mark of the population of students is 66. (7)
- (b) Two independent samples of sizes 7 and 6 have the following values. Examine whether the samples have been drawn from normal populations having the same variance. (8)

Sample A :	28	30	32	33	31	29	34
Sample B :	29	30	30	24	27	28	

OR

- IX. (a) Find the least sample size required if the length of the 95% confidence interval for the mean of normal population with standard deviation 5 should be less than 6. (7)
- (b) The average income of persons was ₹210 with a SD of ₹10 in a sample of 100 people of a city. For another sample of 150 persons, the average income was ₹220 with a SD of ₹12. The SD of incomes of the people of the city was ₹11. Test whether there is any significant difference between the average incomes of the localities. (8)

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B.Arch. Degree I & II Semester Examination May 2016

AR 1107 GEOMETRICAL DRAWING (2014 Scheme)

Time : 4 Hours

Maximum Marks : 100

Instructions:

- (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) Define representative fraction. Also explain the difference between plain scale and diagonal scale.
- (b) Name and explain different types of conic sections.
- (c) Explain the terms, orthographic projection and first angle projection.
- (d) A point 'P' is 40 mm in front of VP and 30 mm from HP. Draw all possible orthographic projections of the point.
- (e) Define 'trace of a line'. Also give the method to locate horizontal trace and vertical trace of a line.
- (f) Explain the method to draw the development of surface of a cone.
- (g) Differentiate isometric projection and isometric view.
- (h) Compare orthographic projection with perspective projection.

PART B

(Retain all construction lines)

(4 × 15 = 60)

- II. Construct a parabola with base 80 mm and axis 60 mm, using rectangular method. Draw a tangent and normal at any point on the parabola. (15)
- OR**
- III. Construct a logarithmic spiral of one convolution. The shortest radius is 18 mm and the ratio of length of the radius vectors enclosing an angle of 30° is 9/8. Also draw a tangent and normal at any point on the curve. (15)
- IV. A line AB, 90 mm long, makes an angle of 30° with HP and 45° with VP. One end 'A' of the line is 10 mm above HP and 20 mm in front of VP. Draw the projections and mark the traces (HT & VT) of the line AB. (15)
- OR**
- V. A square pyramid of base 50 mm side and axis 100 mm long has a triangular face of HP. If the vertical plane containing the axis makes an angle of 30° with VP, draw the projections. (15)

(P.T.O.)

1660



VI. A cone of base diameter 70 mm and length of axis 80 mm is resting on its base on HP. It is cut by a section plane perpendicular to VP and inclined at 45° to HP. If the section plane cuts the axis at its centre, draw the front view, sectional top view and true shape of the section. (15)

OR

VII. Frustum of a square pyramid has base of side 50 mm and top side 30 mm. Height of the frustum is 60 mm. Determine the shortest distance measured along the surface between a corner of base and the opposite corner of the top face. (15)

VIII. A square pyramid is lying on one of its triangular faces upon HP. The base edge of the pyramid on HP is perpendicular to VP. If the edge of base is 50 mm and the axis is 60 mm long, draw the isometric view of the pyramid. (15)

OR

IX. A square pyramid of base 40 mm and axis 60 mm is resting on the ground plane (GP) on its base with one of the base edges parallel to the Picture Plane (PP) and 10 mm away from the PP. The station point is 50 mm in front of the PP and 80 mm above the GP. If the Central Plane (CP) is 50 mm to the right side of the axis of the pyramid, draw the perspective projection. (15)

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B.Arch. Degree I & II Semester Examination May 2016

AR 1108 MECHANICS OF STRUCTURES (2014 Scheme)

Time : 3 Hours

Maximum Marks : 100

PART A (Answer ALL questions)

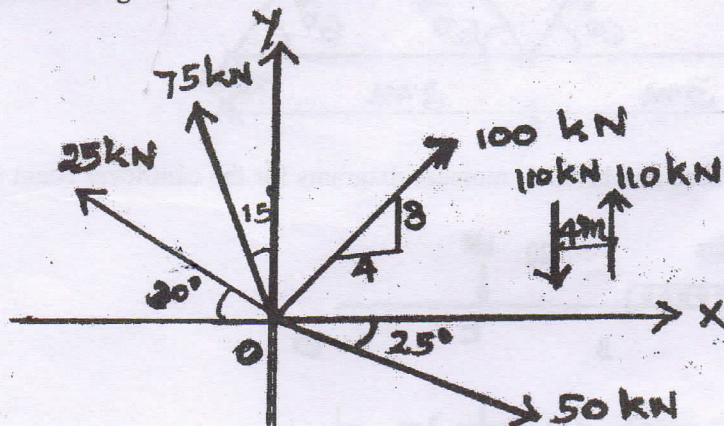
(8 × 5 = 40)

- I.
- State the principles of statics.
 - Explain the equilibrium of forces on a rigid body with the help of free body diagram.
 - Derive moment of inertia of a rectangular section about its centroidal axes.
 - Explain a truss structure and discuss the assumptions in the analysis of truss.
 - Derive the relationship between shear force and bending moment.
 - Determine maximum bending moment and shear force in a simply supported beam of span l carrying uniformly distributed load of intensity w/m throughout the span and draw B.M. diagram and S.F diagram.
 - Derive the relationship between Young's modulus E and bulk modulus K .
 - State the assumptions in the theory of simple bending and state bending formula with the explanation of notations.

PART B

(4 × 15 = 60)

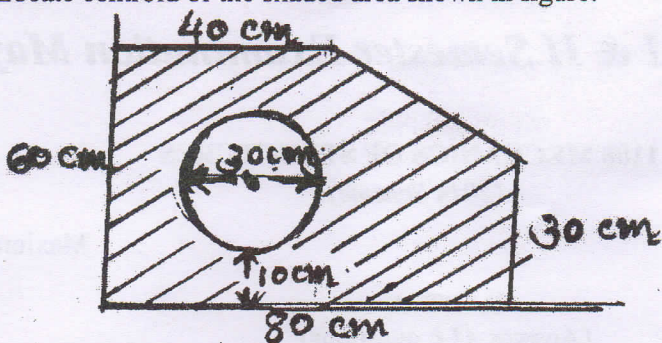
- II. Determine the resultant force and mark its direction for the system of forces shown in figure.



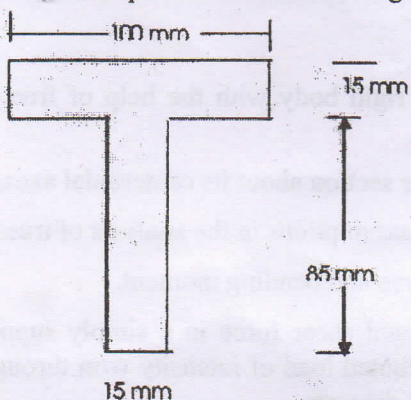
OR

(P.T.O.)

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

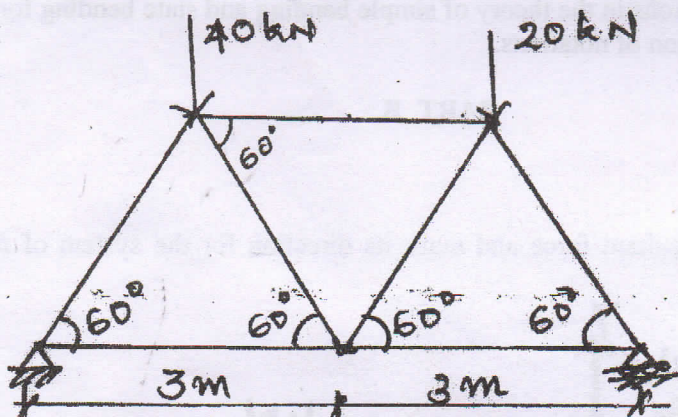


IV. Determine the moment of inertia about the centroidal horizontal and vertical axes of the plane area shown in figure.

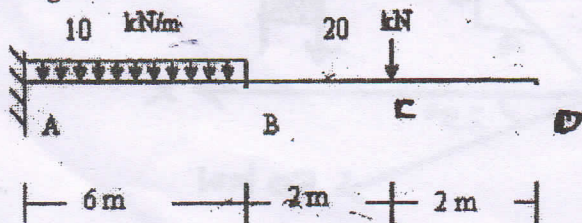


OR

V. Analyze the truss shown in figure.



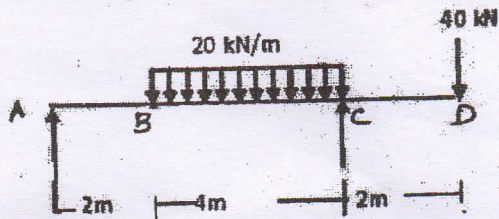
VI. Draw shear force and bending moment diagrams for the cantilever beam shown in figure.



OR

(Contd...3)

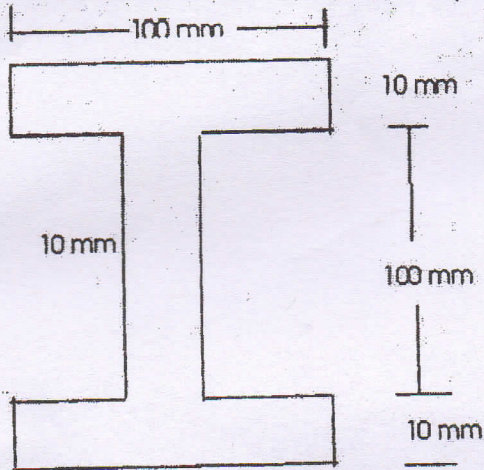
- VII. Draw bending moment and shear force diagrams for the overhanging beam shown in figure.



- VIII. A compound bar consists of a circular steel rod of diameter 25 mm rigidly fitted into a copper tube of internal diameter 25 mm and thickness 7 mm. If the bar is subjected to a load of 200 kN find the stress developed in the two materials. Take $E_s = 2 \times 10^5 \text{ N/mm}^2$, $E_c = 1.2 \times 10^5 \text{ N/mm}^2$.

OR

- IX. A simply supported beam of 6 m span has cross section I as shown in figure. It is subjected to uniformly distributed load of 10 kN/m over its entire length. Determine the maximum bending stress developed in the beam.



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B.Arch. Degree I & II Semester Examination May 2016

AR 1109 SURVEYING AND LEVELING (2014 scheme)

Time : 3 Hours

Maximum Marks : 100

PART A (Answer ALL questions)

(8 × 5 = 40)

- I. (a) What factors should be considered in deciding the stations of a chain survey?
- (b) Describe briefly the use of various accessories of a plane table.
- (c) Which are the temporary adjustments to be done in a theodolite surveying?
- (d) What is error of closure in a traverse? How is it balanced?
- (e) Differentiate vertical photographs and oblique photographs.
- (f) What are the uses of Distomat and Theomat?
- (g) Distinguish between line of collimation and line of sight.
- (h) Write any five characteristics of contours.

PART B

(4 × 15 = 60)

- II. (a) Explain the procedure for chaining on sloping ground. (7)
- (b) Explain how will you continue chaining past the following obstacles. (8)
(i) a pond (ii) a river (iii) a hill (iv) a tall building

OR

- III. (a) What is three point problem? How is it solved by Bessel's method? (9)
- (b) What are the different sources of error in plane tabling? (6)

- IV. How do you measure the horizontal angle AOB and the magnetic bearing of a line AB by using a theodolite? Explain in detail. (15)

OR

- V. Give a list of the permanent adjustments of a theodolite and state the object of each of the adjustment. Describe how you would make the adjustment of the horizontal axis. (15)

- VI. (a) What is GPS? Explain its uses. (9)
- (b) What are the advantages of total station over other surveying instruments? (6)

OR

(P.T.O.)

- VII. (a) What are the main parts of an aerial camera? Discuss briefly. (8)
(b) How would you determine the scale of a given vertical photograph? (7)

VIII. The following consecutive readings were taken with a level and 3 m leveling staff on continuously sloping ground at a common interval of 20 metres. (15)
0.602, 1.234, 1.860, 2.574, 0.238, 0.914, 1.936, 2.872, 0.568, 1.824, 2.722.
The reduced level of the first point was 192.122. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points and apply the usual arithmetic checks.

OR

- IX. (a) Explain, with sketches any four uses of contour maps. (10)
(b) Explain any one method of interpolating contours. (5)
