

## B.Arch. Degree I & II Semester Examination April 2020

### AR 1101 ARCHITECTURAL DESIGN I (2014 Scheme)

Time: 4 Hours

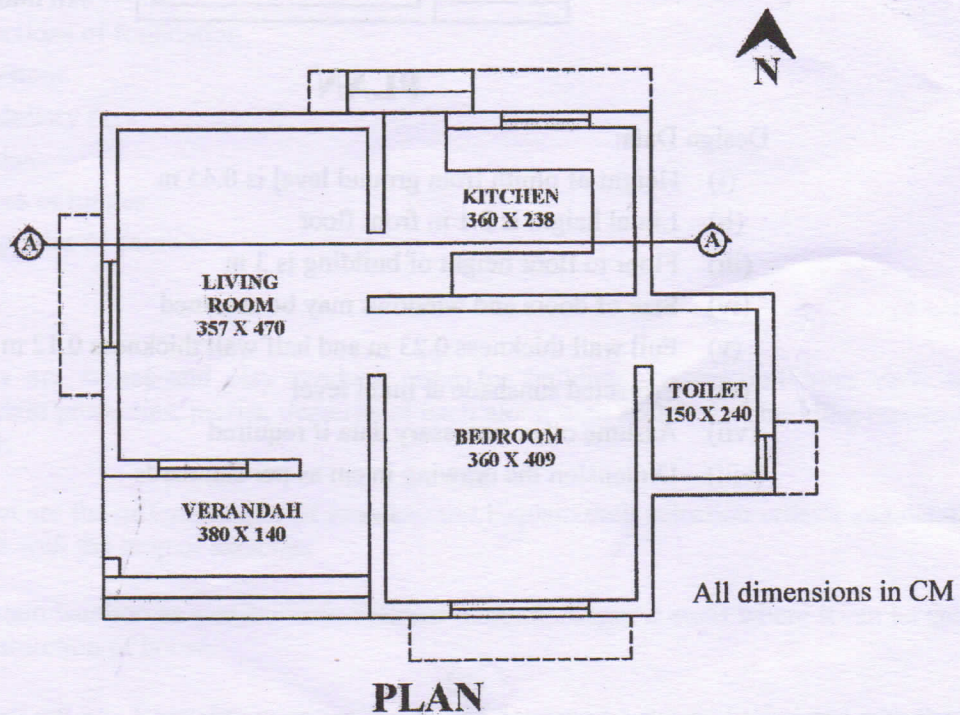
Maximum Marks: 100

- Instructions:**
- One drawing sheet (A1 size) and two 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

(Answer ANY ONE question)

(1 × 100 = 100)

- I. 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. (20)
  - Section through the section line A-A' in scale 1:50. (20)
  - Door/Window schedule. (10)



**Design Data:**

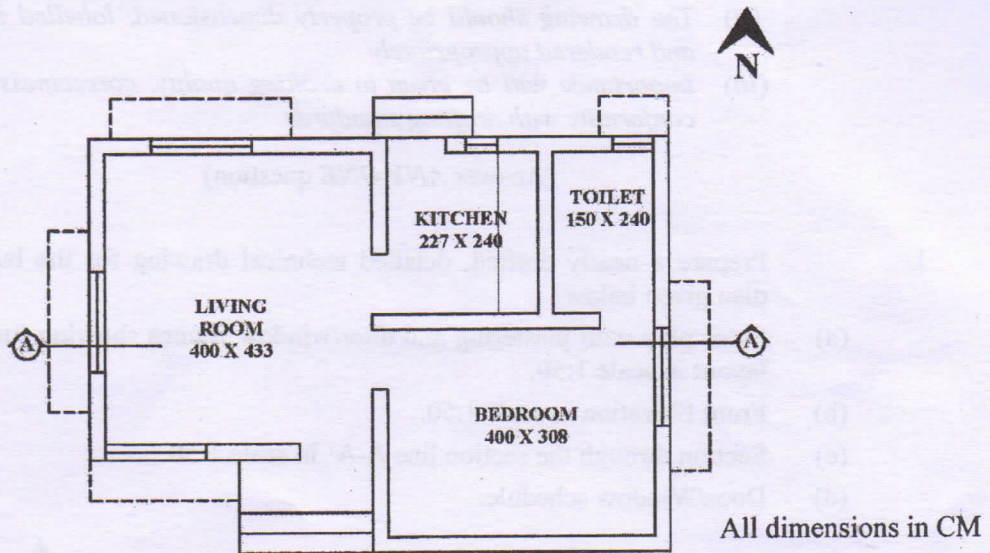
- Height of plinth from ground level is 0.45 m
- Lintel height is 2.1 m from floor
- Floor to floor height of building is 3 m
- Size of doors and windows may be assumed
- Full wall thickness 0.23 m and half wall thickness 0.12 m
- Projected sunshade at lintel level
- Assume other necessary data if required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

- (a) Floor plan with plastering and door/window frames showing furniture layout in scale 1:50. (50)
- (b) Front Elevation in scale 1:50. (20)
- (c) Section through the section line A-A' in scale 1:50. (20)
- (d) Door/Window schedule. (10)



### PLAN

#### Design Data:

- (i) Height of plinth from ground level is 0.45 m
- (ii) Lintel height is 2.1 m from floor
- (iii) Floor to floor height of building is 3 m
- (iv) Size of doors and windows may be assumed
- (v) Full wall thickness 0.23 m and half wall thickness 0.12 m
- (vi) Projected sunshade at lintel level
- (vii) Assume other necessary data if required
- (viii) Dimension the drawing in cm as per standards

\*\*\*

--	--	--	--	--	--	--	--	--	--

## *B.Arch. Degree I & II Semester Examination April 2020*

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

Time : 4 Hours

Maximum Marks : 100

**Instructions:**

- One drawing sheet to be supplied.
- Assume suitable details and dimensions wherever necessary.
- Illustrations in answer carry due mark.
- Credit will be given for following standard architectural drafting and detailing conventions.

#### PART A

(8 × 5 = 40)

- I. Write short notes on the following:
- (a) Manufacturing process of brick
  - (b) Types of concrete
  - (c) Functions of foundation
  - (d) Keystone
  - (e) Medullary rays
  - (f) Glulam
  - (g) Types of hinges
  - (h) Properties of bamboo

(2 × 10 = 20)

- II. Why are stones and clay products used for building construction from early ages? Explain properties, merits, demerits of each along with sketches of building representing each.

**OR**

- III. What are the different types of foundations? Explain their selection criteria and detail out each with the help of sketches.

- IV. Explain bamboo as a sustainable building material. Suggest areas where it can be used in construction of house.

**OR**

- V. Detail out any 5 wooden joineries, 5 types of doors and 5 types of windows with the help of sketches.

#### PART B

(2 × 20 = 40)

- VI. Draw to suitable scale the plan of odd and even courses of a 1 ½ brick thick wall for a right angled corner of a room constructed in single Flemish bond. Draw a section and elevation of this wall.

**OR**

- VII. Draw to a suitable scale the elevation of a pointed arch of span 120cm and rise 90cm. Indicate the important parts of the arch.

(P.T.O.)

VIII. Draw to suitable scale the plan, section and elevation of a partly glazed, partly paneled double shutter wooden door for an opening 100cm × 210cm. Indicate parts of the door. Assume the necessary data.

OR

IX. Draw the following to an appropriate scale:

- (i) Mortise and Tenon joint
- (ii) Tongue and groove joint
- (iii) Cross halving joint
- (iv) Tusk Tenon joint

\*\*\*

--	--	--	--	--	--	--	--

## ***B.Arch. Degree I & II Semester Examination April 2020***

### **AR 1103 HISTORY OF ARCHITECTURE I** (2014 Scheme)

*(Support the answers with neat sketches)*

Time: 3 Hours

Maximum Marks: 100

#### **PART A** (Answer *ALL* questions)

(8 × 5 = 40)

- I. Write short notes on the following:
- (a) Climatic factors influencing the architectural character of a place
  - (b) Walled settlement of Jericho
  - (c) Ishtar Gate
  - (d) Mastabas
  - (e) Great Stupa at Sanchi
  - (f) Rathas at Mahabalipuram
  - (g) Padmanabhapuram Palace
  - (h) Varikkassery Mana

#### **PART B**

(4 × 15 = 60)

- II. Explain with sketches the different kind of houses built by the Jomon people.
- OR**
- III. Explain briefly settlements in India with respect to early Harappan civilization.
- IV. Why was the Indus valley civilization considered as one of the most advanced civilization of its time?
- OR**
- V. What were the different styles of classical orders used by the Greeks and Romans?
- VI. Explain the different types of planning principles used during the Vedic era in India.
- OR**
- VII. Explain with examples the northern, southern and central styles of ancient Indian temple architecture.
- VIII. Roof forms a dominant visual feature of Kerala architecture. Discuss with examples.
- OR**
- IX. Describe the salient features of Vadakkumnathan temple at Thrissur.

\*\*\*

--	--	--	--	--	--	--	--

***B.Arch. Degree I & II Semester Examination April 2020*****AR 1105 ARCHITECTURAL GRAPHICS I  
(2014 Scheme)**

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

Time: 4 Hours

Maximum Marks: 100

(4 × 25 = 100)

- I. Describe Da Vinci paintings and his contribution to world. Explain with any two examples.
- OR**
- II. Explain the 2D and 3D aspects of painting and how does color, texture and light enhance the effect.
- III. Compose three solids of sphere, cylinder and cube in a square of 12 cm × 12 cm and render it in black and white as if the light is falling from left side at an angle of 45 degrees from horizontal and vertical axis.
- OR**
- IV. Draw a pencil drawing of a composition of triangular prismatic and spherical forms, depicting any theme of your choice. Label your composition accordingly.
- V. Design a multicolor poster for the campaign of "SAVE WATER" – size of the poster is 22 cm × 18 cm. Use any color medium.
- OR**
- VI. Sketch a light and shade pencil drawing: A Bird's eye view of a junction.
- VII. Define the fundamental principles of visual art. Give illustrative sketches to explain the principles of composition in art.
- OR**
- VIII. Draw an interior space of a doctor's consultation room with appropriate furniture and human figures. Render it with perspective possibility with light and shade in pencil.

\*\*\*

--	--	--	--	--	--	--	--

## B.Arch. Degree I & II Semester Examination April 2020

### AR 1106 MATHEMATICS

(2014 Scheme)

Time: 3 Hours

Maximum Marks: 100

#### PART A

(Answer ALL questions)

(8 × 5 = 40)

- I. (a) Solve  $(3x^2 + 2e^y)dx + (2xe^y + 3y^2)dy = 0$ .
- (b) Find the general solution of the equation  $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 4y = 65 \sin 2x$
- (c) If  $u = \log \left( \frac{x^2 - y^2}{x^2 + y^2} \right)$  then prove that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 0$ .
- (d)  $u = x + 2y + z, v = x - 2y + 3z, w = 2xy - zx - 2z^2 + 4yz$ . Find the Jacobian of  $u, v, w$  with respect to  $x, y, z$ .
- (e) Find the probability that at most 5 defective bolts will be found in a box of 200 bolts if it is known that 2% of such bolts are expected to be defective.
- (f) If  $X$  is uniformly distributed random variable with mean 1 and variance  $4/3$ , find  $p(X < 0)$ .
- (g) A random sample of size 17 from a normal population is found to have mean 4.7 and variance 5.76. Find a 90% confidence interval for the population mean.
- (h) Define the following terms
- (i) Level of significance
  - (ii) Type I error
  - (iii) Type II error
  - (iv) power of a test
  - (v) critical region

#### PART B

(4 × 15 = 60)

- II. (a) Solve  $(D^2 - 6D + 9)y = 6e^{3x} + x^2$ . (7)
- (b) Solve  $\frac{dx}{dt} + 5x - 2y = t; \frac{dy}{dt} + 2x + y = 0$ . (8)
- OR
- III. (a) Solve  $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + 4y = \cos(\log x) + x \sin(\log x)$  (7)
- (b) Solve  $(D^2 + 4D + 7)y = \cos^2(2x) + x^2 e^x$  (8)
- IV. (a) If  $u = \frac{1}{r}$  where  $r^2 = (x-a)^2 + (y-b)^2 + (z-c)^2$  (7)
- prove that  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$ .

(P.T.O.)

- (b) The torsional rigidity of a length of a wire is obtained from the formula (8)  
 $T = \frac{4\pi Il}{t^2 r^4}$ . If  $l$  is decreased by 1.5% ,  $r$  is increased by 2% and  $t$  is decreased by 2%, Find the percentage rate of increase of  $T$ .

OR

- V. (a) State Euler's theorem on homogeneous functions. Verify the theorem for (7)  
 $u = (x^2 + xy + y^2)^{-1}$ .
- (b) Show that of all rectangular parallelepiped with given volume, the cube has the least surface area. (8)
- 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. (7)
- (i) no defectives  
 (ii) two defectives  
 (iii) not more than two defectives  
 (iv) 2 or 3 defectives
- (b) Fit a second degree parabola for the following data: (8)

X:	1	2	3	4	5
Y:	3	9	13	21	31

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 SD 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 hour
- (b) Obtain the regression lines of the following data. Also find the correlation coefficient: (8)

X:	6	2	10	4	8
Y:	9	11	5	8	7

- VIII. (a) A company claims that the mean life of its bulbs produced is 1600 hours. A random sample of 100 bulbs gave a mean life of 1570 hours with a SD of 120 hours. Test the claim at (i) 5% level (ii) 1 % level (7)
- (b) In comparing the variability of the tensile strength of two kinds of structured steel, an experiment yielded the following results  $n_1=13$ ,  $s_1^2=19.2$ ,  $n_2=16$  and  $s_2^2=3.5$  where the units of measurement are 1000 pounds per square inch. Assuming that the measurements constitute independent random samples from two normal populations, test the null hypothesis  $\sigma_1^2 = \sigma_2^2$  against the alternative  $\sigma_1^2 \neq \sigma_2^2$  at 0.01 level of significance. (8)

OR

- IX. (a) Suppose that the thickness of a part used in a semiconductor is its critical dimensions and that measurements of the thickness of a random sample of 18 such parts have variance  $S^2=0.68$  where the measurements are in thousand times of an inch. The process is considered to be under control if the variation of the thickness is given by a variance not greater than 36. Assuming that the measurements constitute a random sample from a normal population, test the null hypothesis  $\sigma^2=0.36$  against the alternative hypothesis  $\sigma^2 > 0.36$  at 5%. (7)
- (b) The height of six randomly chosen sailors are in inches 63,65,58,69,71 and 72. The height of the 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 the average shorter than sailors? Test at 5% level of significance. (8)



--	--	--	--	--	--	--	--

## ***B.Arch. Degree I & II Semester Examination April 2020***

### **AR 1107 GEOMETRICAL DRAWING** (2014 Scheme)

Time: 4 Hours

Maximum Marks: 100

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

#### **PART A**

(Answer ALL questions)

(8 × 5 = 40)

- I. (a) Define eccentricity. Explain different conic sections, based on eccentricity.  
(b) Differentiate between archimedian spiral and logarithmic spiral.  
(c) Explain the method of drawing the traces (HT & VT) of a line from the orthographic projections, with the help of sketches.  
(d) Describe the method of auxiliary projection, with the help of sketches.  
(e) Explain any two methods to draw the development of a sphere.  
(f) Explain the method for drawing the true shape of a section, graphically.  
(g) Construct an isometric scale of any dimension and state its significance.  
(h) Differentiate between isometric projection and isometric view.

#### **PART B**

(4 × 15 = 60)

- II. A point A is moving such that it is always equidistant from a given line and a fixed point. The distance between the fixed line and fixed point is 60 mm. Trace the path of the point A and name the curve. Also draw a tangent and normal at any point on the curve.

**OR**

- III. Construct a logarithmic spiral for one convolution. The final radius vector is 90 mm and the ratio of length of radius vectors enclosing an angle of 30° is 9/8. Draw normal and tangent at any point on the curve.

- IV. Line AB is 90 mm long. The end A is 20 mm above HP and 10 mm in front of VP. Its midpoint C is 50 mm above HP and 40 mm in front of VP. Draw the projections and mark the inclinations of the line with HP and VP.

**OR**

- V. A square pyramid of base edge 50 mm and axis 90 mm long has a triangular face in HP and the vertical plane containing the axis makes an angle of 30° with VP. Draw the projections.

- VI. A regular tetrahedron of 65 mm edges is lying on the ground with one of its faces on the ground with an edge perpendicular to VP. It is cut by a section plane perpendicular to VP so that the true shape of the section is an isosceles triangle of base 40 mm and altitude 40 mm. Draw the sectional top view, front view and true shape of section.

**OR**

(P.T.O.)

VII. A square pyramid side of base 40 mm and axis 70 mm is resting on its base on the ground with an edge of base inclined at  $30^\circ$  to VP. It is cut by a section plane perpendicular to VP and inclined at  $45^\circ$  to HP. The section plane is passing through a point on the axis 30 mm above the base. Draw the development of the bottom portion of the pyramid.

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

OR

IX. A square pyramid, edge of base 50 mm and axis 80 mm is resting on the ground with one side of base parallel to picture plane and 30 mm behind the picture plane. The axis is 50 mm to the left of the station point. The station point is 100 mm above the ground plane and 80 mm in front of the picture plane. Draw the perspective projection of the square pyramid.

\*\*\*

**B.Arch. Degree I & II Semester Examination April 2020****AR 1108 MECHANICS OF STRUCTURES**  
(2014 Scheme)

Time: 3 Hours

Maximum Marks: 100

**PART A**  
(Answer *ALL* questions)

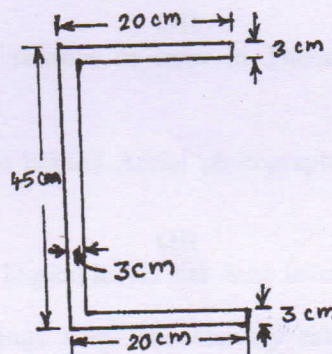
(8 × 5 = 40)

- I. (a) Explain polygon law of forces.  
 (b) Explain cone of friction and angle of repose.  
 (c) Differentiate parallel and perpendicular axis theorems.  
 (d) Explain the analysis of trusses by the method of joints.  
 (e) Draw the shear force and bending moment diagrams of a cantilever beam subjected to u.d.l. for entire span and point load at free end.  
 (f) What is point of contraflexure and give examples with sketches?  
 (g) Which are the elastic constants and the relations among them?  
 (h) What are the assumptions in theory of simple bending?

**PART B**

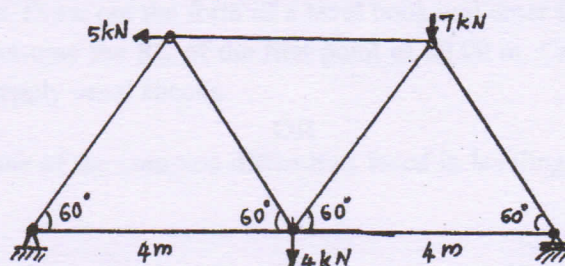
(4 × 15 = 60)

- II. Find the resultant of forces 3,2,4,5 and 3N that act at an angular point of a regular hexagon towards the other angular points taken in order.
- OR
- III. Determine the centre of gravity of a solid right circular cone of height H and base circle of radius R.
- IV. Determine moment of inertia about the centroidal XX and YY axes of the channel section for the following figures.



OR

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

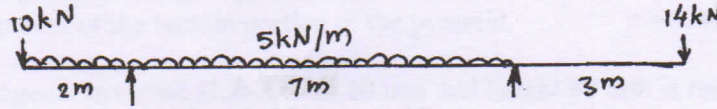


(P.T.O.)

VI. Draw the SFD and BMD of a simply supported beam of span 7 m carries u.d.l. of 15 kN/m for the right half span.

OR

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



VIII. A compound bar consists of a circular rod of steel 20 mm diameter rigidly fitted into a copper tube of internal diameter 20 mm and thickness 5 mm. If the bar is subjected to a load of 100 kN, find the stresses developed in the two materials. Modulus of Elasticity of steel is  $2 \times 10^5 \text{ N/mm}^2$  and of copper is  $1 \times 10^5 \text{ N/mm}^2$ .

OR

IX. A simply supported beam of span 5 m and a rectangular cross section  $120 \text{ mm} \times 250 \text{ mm}$ . Find the uniformly distributed load it can carry, if the maximum bending and shear stresses are not to exceed  $15 \text{ N/mm}^2$  and  $1 \text{ N/mm}^2$  respectively.

\*\*\*

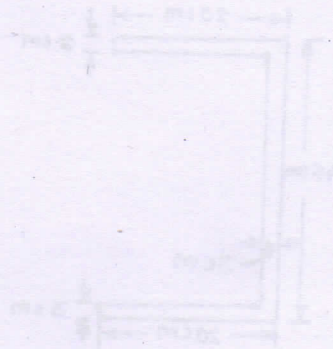
PART B

II

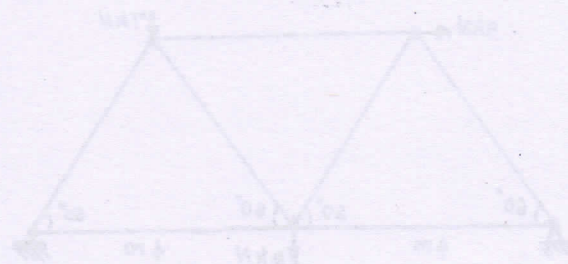
OR

III

IV



OR



--	--	--	--	--	--	--	--

**B.Arch. Degree I&II Semester Examination April 2020****AR 1109 SURVEYING AND LEVELLING**

(2014 Scheme)

Time: 3 Hours

Maximum Marks: 100

**PART A**  
(Answer *ALL* questions)

(8 × 5 = 40)

- I. (a) Explain classification of survey.  
(b) List the advantages of plane table survey.  
(c) What are the checks made in a closed traverse? Explain.  
(d) What are the desired relations between the fundamental lines of a transit theodolite? Discuss.  
(e) How Distomat used in surveying?  
(f) Explain the principle of Aerial photography.  
(g) What are the different types of bench marks. Explain.  
(h) List the sources of error in levelling.

**PART B**

(4 × 15 = 60)

- II. What are the various obstacles in chain surveying and explain how they are overcome?

**OR**

- III. What is three point problem? Describe a solution of three point problem by plane table.

- IV. Explain the temporary adjustments to be carried out in a theodolite. Also explain any one permanent adjustment.

**OR**

- V. Explain the various sources of error in Theodolite work. How are they eliminated?

- VI. What is the principle behind Aerial photography? Explain the instruments used.

**OR**

- VII. Write in detail about Digital levels and Auto levels.

- VIII. The following readings were successively taken with an instrument in leveling work 0.320, 0.530, 0.620, 1.780, 1.910, 2.350, 1.750, 0.350, 0.690, 1.240, 0.980 m. The position of the instrument was changed after 3<sup>rd</sup>, 7<sup>th</sup> and 9<sup>th</sup> readings. Draw out the form of a level book and enter the above readings properly. Assume the RC of the first point as 80.00 m. Calculate R.C of all points and apply usual checks.

**OR**

- IX. Explain some of the common difficulties faced in leveling and how they are solved.