INSTRUCTIONS

(a) Answer four questions.
(b) All questions carry equal marks.
(c) Construction lines must be shown on all solutions.
(d) Write the number of the question, distinctly, on the answer paper.
(e) First or third angle projection may be used.
(f) All dimensions are given in metres.
1. Draw a perspective view of the structure shown in Fig. 1. The picture plane passes through the corner A, the spectator S is 9m from the corner A, and the horizon line is 8m above the ground line. Use auxiliary vanishing points where appropriate.

Scale 1 : 100

2. Fig. 2 shows the outline plan, elevation and end elevation of roof surfaces and a dormer window. Surface B has a pitch of 30° and surface E has a pitch of 40°. The dihedral angle between the surfaces A and B is 145°. The dihedral angle between the surfaces B and C is 140°.

(a) Draw the given plan, elevation and end elevation.

(b) Determine the dihedral angle between the surfaces B and E.

Scale 1 : 100
3. Fig. 3 shows the outline plan and elevation of a building. Draw the given views and determine the shadows and shade in plan and elevation when the direction of the light is as shown in the figure.

Scale 1 : 200
4. Fig. 4 (a) shows a pictorial view of a shell structure unit. This unit is combined with four other similar units to form a total roof surface as shown in plan in Fig. 4 (b). The surface of the unit is generated by translating the parabola ABC in a vertical position along the parabola BF whose vertex is at F.

(a) Draw a plan, elevation and end elevation of the unit.

(b) Determine the true shape of the curve EF.

Scale 1 : 200

5. On a contour map A and B are two points whose altitudes are 95 m and 75 m respectively. On the map B is located 115 m south-east of A. A skew bore-hole at A is drilled in a south-easterly direction in plan and has an actual inclination of 55° to the horizontal plane. It reveals the top and bottom surfaces of a stratum at distances of 15 m and 40 m, respectively, from A.

A skew bore-hole at B is drilled in a south-westerly direction in plan and has an actual inclination of 50° to the horizontal plane. It reveals the top and bottom surfaces of the stratum at distances of 40 m and 65 m, respectively, from B.

(a) Determine the dip, strike and thickness of the stratum.

(b) Another skew bore-hole at B is drilled in a south-easterly direction in plan and reaches the bottom surface of the stratum at an altitude of 15 m. Determine the length of this bore-hole as it passes through the stratum.

Scale 1 : 1000
6. Fig. 5 shows the outline plan and elevation of two adjoining hyperbolic paraboloid roof surfaces ABCD and BEDC which have been shaped as shown.

(a) Draw the given plan and elevation.

(b) Determine the true shape of the section S-S through the roof.

(c) Determine the traces of the plane director for the edges BE and CD of the surface BEDC and having its horizontal trace passing through B.

Scale 1 : 200

7. The accompanying drawing shows ground contours at five-metre vertical intervals. AB is the line of a proposed roadway and CDEF a proposed parking area. The roadway AB has the following specification:

(i) formation width from A to B is 15 m, from C to F the road is widened as shown to form the parking area CDEF;

(ii) formation level at A is 35 m;

(iii) gradient A to B is 1 in 15 falling;

(iv) side slopes for cuttings 1 in 1.5;

(v) side slopes for embankments 1 in 2.

In the parking area CDEF the sides CD and FE are level and the gradient from C to F is 1 in 15 falling. The side slopes for cuttings and embankments are the same as for the roadway.

On the drawing supplied show the earthworks necessary to accommodate the roadway and parking area.