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THE INSTUTUTION OF ENGINEERS SRI LANK

PART I EXAMINATION – MAY 2009

102 - PRESENTATION OF ENGINEERING INFORMATION – PAPER I

Time Allowed – Three (03) Hours **Date of Examination: May2009**

Before start answering the question paper, read the instructions given below and adhere to these instructions.

- This question paper has three sections. SECTION A, SECTION B, and SECTION C. Answer FIVE (05) questions ONLY selecting at least one from each SECTION 1 and SECTION III and two from SECTION II .
- All questions carry equal marks.
- Use separate answer books for each section. Write the section identification letter on the front page of the answer book. Hand over each answer book separately.
- Write the question No. to which you answer appropriately in the cage appearing on the cover page of the answer book.
- To answer Questions in Section A make neat, clear, free hand sketches. Where applicable, show the details of geometrical constructions and method of projections. All drawings should be drawn to a suitably assumed scale. In case of mechanical components/systems, show the details of principles of operations associated with.
- Strike out any rough work and contents that you do not wish draw the attention of the examiner.
- Marks will be deducted if the above instructions are not adhered to.

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SECTION A

Question 1

(i) Make sketches of any of three of the following items, so that the selected views and method of projections in each case best demonstrate the working mechanism, components and special features, if any, associated with the relevant item.

(a) Bench vice

(b) Hand operated screw press

(c) Centrifugal water pump with electric motor

(d) Claw hammer

(e) Lock plier

(ii) Sketch an exploded assembly drawing of a toggle switch. Name its components. The components should have sizes decided proportionately.

Question 2

Figure Q2 shows a pictorial view of a solid object. Produce the following views to a scale of full size in the first angle projection.

a) Front Elevation looking in the direction X

b) Sectional End Elevation taken on plane Y-Y

c) The Plan

Question 3

a) A right circular cone is penetrated by a horizontal cylinder as shown in Fig. Q3 (a) Complete the given views by constructing accurately the curves of interpenetration. Hidden curves must be shown in dotted lines.

b) Figure Q3 (b) shows the Elevation and Plan of a solid object. Sketch the isometric view of it taking the near point described by the arrow.

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SECTION B

Question 4

A Boolean function is given by,

$$\mathbf{f}\ (A,B,C,D) = \Sigma\ 2,6,7,8,12,13$$

(a) Simplify **f** using a Karnaugh map

(b) Give the truth table for **f** and hence obtain an expression for the inverse function of **f**.

(c) Simplify the inverse function of **f** using a Karnaugh map

(d) Draw the logic circuit, using suitable gates, for implementation of **f** using the result of (c) above.

Question 5

(a) Draw an Analogue Computer block diagram for solving the following differential equation:

$d^3t/dt^3 - 1.6\ dy/dt + 4 = 0$

with the initial conditions, $y = 0.75$ and $dy/dt = -1.5$, at $t = 0$.

(b) Write an algorithm to find the largest number in an array of five numbers.

Question 6

(a) Explain the terms Total Float, Free Float and Independent Float as applicable to Critical Path Analysis

(b) The activities constituting a project, with the immediate predecessor activities of each activity, are given in the table below.

(i.). Draw a Network to represent the logical sequence of tasks and determine the minimum time required for completion of the project.

(ii). Identify the critical path of the network

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Activity	Duration (days)	Predecessor Activities
A	8	-
B	.4	-
C	4	A
D	2	A
E	3	C, D
F	2	B
G	1	-
H	2	E, F
I	3	H, G
J	4	I
K	3	J
L	4	K

Question 7

(a). A new surgical procedure is said to be successful 80 per cent of the time. If the operation is performed five times, and if it can be assumed that the results are independent of one another, find the probability that at least four operations are successful.

(b). Records indicate that the number of buses passing a certain bridge is 0.4 per minute on the average. If the above probability distribution can be assumed to be a Poisson's distribution, what is the probability that there will be at least one bus passing the bridge during the next two minutes.

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Question 8

Suppose that the pH of the soil samples taken from a certain geographic region is normally distributed with a mean pH 6.00 and standard deviation 0.10. If the pH of a randomly selected soil sample from this region is determined,

(a). What is the probability that the resulting pH is between 5.90 and 6.15 ?

(b). What is the probability that the resulting pH exceeds 6.10 ?

(c) What is the probability that the resulting pH is at most 5.95 ?

(d) What value will be exceeded by only 5% of all such pH's?

SECTION C

Question 09

(a) Design a logic circuit that receives four bit binary number ABCD and gives an output whenever the number is divisible either by 4 or 5.

(b) Draw a block diagram for the logic circuit.

(c) Write a truth table for the given system.

(d) Simplify this function to minimum sum of product with the help K-map (Karnaugh map).

(e) Implement this logic circuit using minimum number of AND gates and OR gates.

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Question 10

Draw flow chart which generates an n line table of integers as shown below. The input number is the integer n. for example, when n=4 the table will be as follows.

```
   1
  2  2
 3  3  3
4  4  4  4
```

Write pseudo-code program for above algorithm. You may also use a high level programming language such as PASCAL, C programming, etc. state clearly the chosen programming language.

---------END--------

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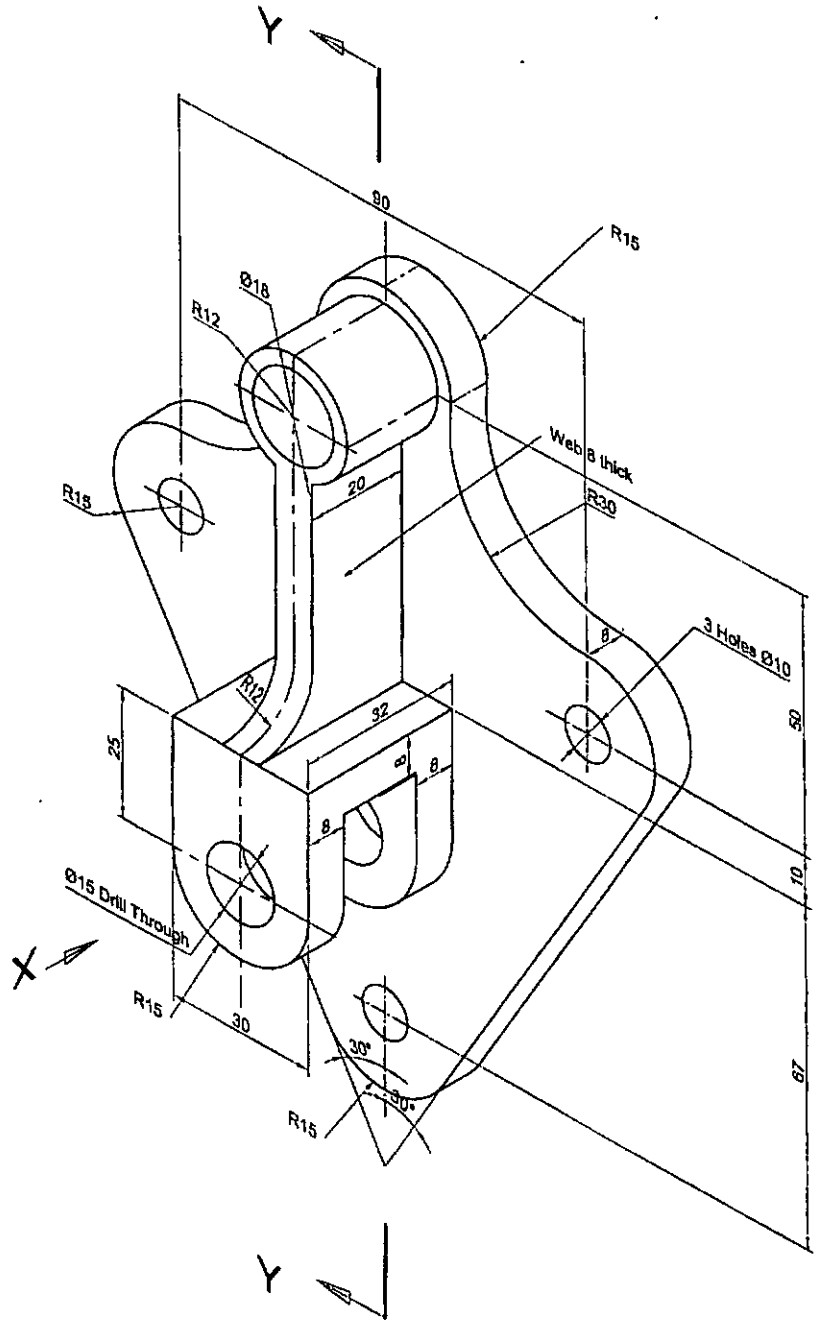

Fig. Q 2

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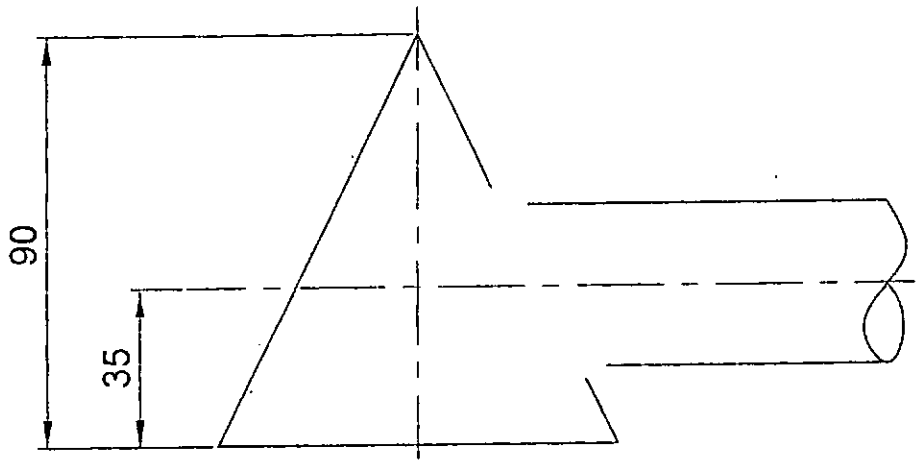
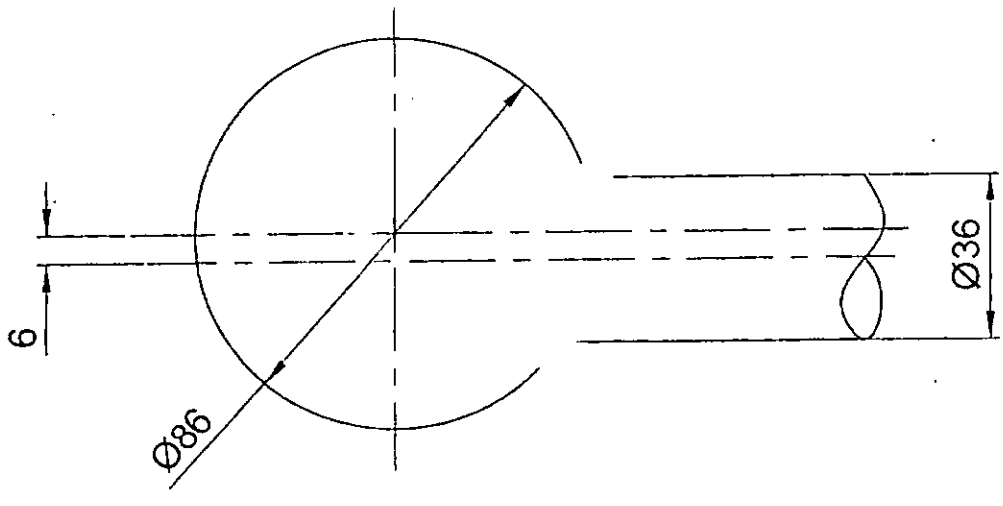


FRONT ELEVATION



PLAN

Fig. Q3 (a)

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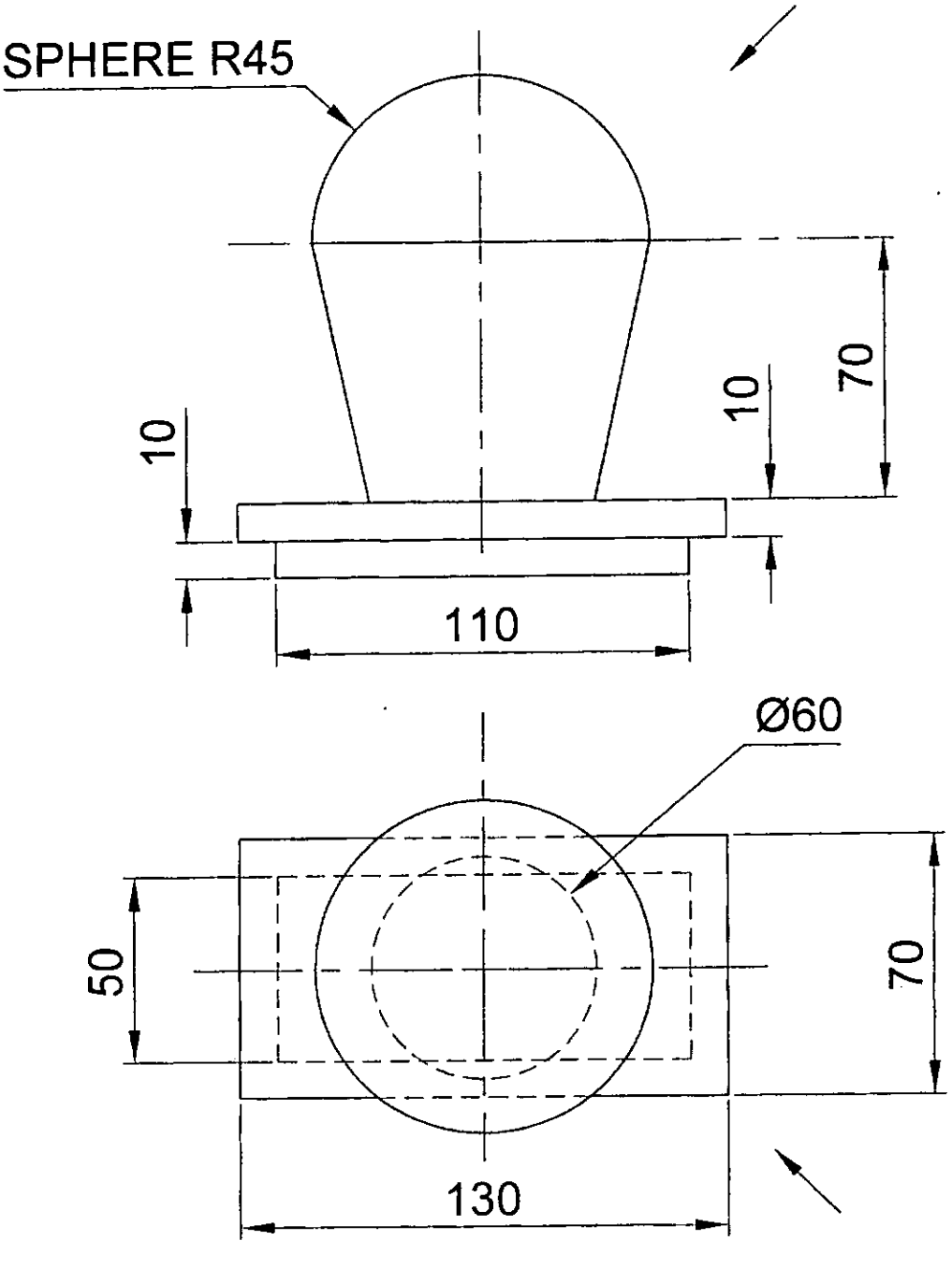

Fig. Q 3(b)

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