V-L-II-Hf-Ex-12-B-40

Con. 8824-12.

KR-3531

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** from remaining **six** questions.

1. (a) Using Taylor's series find y(0·4) where $\frac{dy}{dx} = 1 + xy$ with $y(0) = 2$. 3

(b) Find the Complementary function of $\frac{d^3y}{dx^3} - 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} - 6y = 0$. 3

(c) Evalaute $\int\limits_{-1}^{1} \int\limits_{0}^{1-x} x^{1/3} y \, dx \, dy$. 3

(d) Evaluate $\int\limits_{0}^{2} \int\limits_{0}^{2} \int\limits_{0}^{yz} xyz \, dx \, dy \, dz$. 3

(e) Show that $\int\limits_{0}^{\pi/2} \frac{d\theta}{\sqrt{\sin\theta}} \int\limits_{0}^{\frac{\pi}{2}} \sqrt{\sin\theta} \, d\theta = \pi$. 4

(f) Using Euler's method solve $\frac{dy}{dx} = x + y$, $y(0) = 1$ find the value of y at x = 1, taking h = 0·2. 4

2. (a) Evalaute $\int\limits_{0}^{1} \sqrt{1 - \sqrt{x}} \, dx \int\limits_{0}^{\frac{1}{2}} \sqrt{2y - 4y^2} \, dy = \frac{\pi}{30}$. 6

(b) Use Runge-Kutta method of fourth order to solve :— 6

$\frac{dy}{dx} = \frac{1}{x+y}$, $y(0) = 1$ find y(0·2) with h = 0·1.

(c) Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$. 8

3. (a) Solve $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$. 6

(b) Solve $\left(D^2 - 1\right)y = \frac{2}{1 + e^x}$ using variation of Parameter. 6

(c) Evaluate $\int\limits_{0}^{\pi/2} \frac{dx}{1 + a \cos^2 x}$ and hence deduce that $\int\limits_{0}^{\frac{\pi}{2}} \frac{\cos^2 x}{\left(3 + \cos^2 x\right)^2} \, dx = \frac{\pi \sqrt{3}}{96}$. 8

[TURN OVER

4. (a) Solve $(xy^3 + y)dx + 2(x^2 y^2 + x + y^4)dy = 0$.   6

   (b) $(1 + 2x)^2 \dfrac{d^2 y}{dx^2} - 2(1 + 2x)\dfrac{dy}{dx} - 12y = 6x$.   6

   (c) Solve $\dfrac{d^2 y}{dx^2} + 2y = x^2 e^{3x} + e^x - \cos 2x$.   8

5. (a) In a circuit containing inductance L, resistance R, and voltage E, the current i is   6
         given by $L\dfrac{di}{dt} + Ri = E$. find the current i at time t, at $t = 0$, $i = 0$, L, R, E are constants.

   (b) Change the order of integration $\displaystyle\int_0^a \int_{\sqrt{a^2 - y^2}}^{y+a} f(x,y)\, dx\, dy$.   6

   (c) Evaluate $\displaystyle\iiint \dfrac{dx\, dy\, dz}{\sqrt{a^2 - x^2 - y^2 - z^2}}$ over the volume of Sphere $x^2 + y^2 + z^2 = a^2$.   8

6. (a) Find the length of the parabola $x^2 = 4y$ which lies inside the circle $x^2 + y^2 = 6y$.   6

   (b) Change into polar and evaluate $\displaystyle\int_0^2 \int_0^{\sqrt{2x - x^2}} \dfrac{x\, dx\, dy}{\sqrt{x^2 + y^2}}$.   6

   (c) Evaluate $\displaystyle\iint_R xy\sqrt{1 - x - y}\, dx\, dy$ over the area of the triangle formed by—   8

        $x = 0$, $y = 0$, $x + y = 1$.

7. (a) Change the order of integration and evaluate :—   6

        $\displaystyle\int_0^a \int_0^x \dfrac{dx\, dy}{(y + a)\sqrt{(a - x)(x - y)}}$

   (b) Find the area outside the circle $r = a$ and inside the cardioide $r = a(1 + \cos\theta)$.   6

   (c) Find the volume common to the cylinders $x^2 + y^2 = a^2$, $x^2 + z^2 = a^2$.   8

———v———

VI-S.II.Exam. Nov.-12- 39

Con. 8837-12.

KR-3546

(2 Hours) [Total Marks : 75

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** questions from Q. Nos. 2 to 7.

(3) **Figures** to **right** indicate **full** marks.

(4) Assume **suitable** data if **necessary**.

1. Attempt any five from the following :— 15

    (a) Explain why we see beautiful colours in thin film when it is exposed to sunlight.

    (b) Why would you recommend use of optical fiber in communication system ?

    (c) Draw the energy level diagram of He-Ne laser. What is its wavelength in visible range ?

    (d) Calculate the De-Broglie wavelength of proton travelling with a velocity equal to $1/20^{th}$ velocity of light. (mass of proton = 1.674×10^{-27} kg).

    (e) The susceptibility of a paramagnetic material at 300 K is 3.7×10^{-3}. Find its relative permeability at 300 K.

    (f) State and explain ohm's law for magnetic circuit

    (g) Define and name different ranges of vaccum in terms of pressure.

2. (a) Explain with neat figure construction and working of Rotary pump. For which vaccum range is it used ? 8

    (b) Write full form of LASER ? Explain main three processes involved in the production of LASER with appropriate figures. 7

3. (a) Derive the formula for numerical aperture for a step index fiber. Calculate the Acceptance angle for an optical fiber given that refractive index of core is 1·45 and refractive index of cladding is 1·4. 8

    (b) Explain the construction and working of semiconductor diode laser with proper sketches. What are merits and demerits of this laser ? 7

4. (a) In a Newton's ring experiment the diameter of the 10th dark ring changes from 1·4 cm to 1·27 cm when a liquid is introduced between the lens and the plate. Calculate the refractive index of the liquid. 5

    (b) Using the uncertanity principle show that electron cannot pre-exist in free state in a nucleus. 5

    (c) A solenoid consisting of 500 turns and carrying 4 Amp. current is 0·5 m long. Calculate :— 5

        (i) Magnetomotive force

        (ii) Flux density B.

[TURN OVER

Con. 8837-KR-3546-12. 2

5. (a) A diffraction grating used at normal incidance gives a line 5400 A° in certain   5
      order superimposed on another line 4050 A° of the next higher order. If the
      angle of diffraction is 30°, how many lines/cm are there on the grating ?

   (b) Derive one dimensional time dependent Schrodinger equation for matter waves.   5

   (c) Explain construction and working of Atomic force microscope.   5

6. (a) Explain the experimental method of determination of wavelength of spectral   5
      line using diffraction grating.

   (b) An electron is bound in one dimensional potential box with width 2·5 A°. Assuming   5
      the hight of the box to be infinite, Calculate the first two permitted energy values
      of the electron.

   (c) Discuss the importance of molecular modeling in bio-physics study.   5

7. (a) White light falls normally on a soap film of thickness 5×10^{-5} cm and of refractive   5
      index 1·33. Which wavelength in the visible region will be reflected most strongly ?

   (b) How the phenomenon of holography be explained with interference and diffraction   5
      of light ?

   (c) What are hard and soft magnetic materials ? Explain these materials using   5
      their characteristic properties and applications.

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F·E· Sem II (Neutral) N|D-2012

Sub- App· Chemistry -II

KR-3585

(2 Hours) [Total Marks : 75

N.B. : (1) Question No. 1 is **compulsory**.
  (2) Attempt any **four** from remaining **six** questions.
  (3) **Figures** to the **right** indicate **full** marks.
  (4) **Assume** suitable additional data if **necessary**.
  (5) Atomic weights : H = 1, C = 12, N = 14, O = 16, Na = 23, Mg = 24, S = 32, Cl = 35.5, Ca = 40.

1. Answer any **five** from the following :– 15
  (a) Give the characteristics of good fuel.
  (b) Give the composition, properties and uses of Gun metal.
  (c) What is Green Chemistry ? Give its significance.
  (d) What are composite materials ? What are the applications of composites.
  (e) Explain homogenous and heterogenous catalysis.
  (f) Explain Galvanic corrosion.
  (g) In a Kjeldahl's apparatus, 3.5g of the coal sample was analysed. The NH_3 gas evolved was absorbed in 50 ml of 0.1N H_2SO_4. The residual H_2SO_4 required 15 ml of 0.1N NaOH for neutralisation. Calculate percentage of nitrogen in the sample.

2. (a) Calculate the weight and volume of air required for complete combustion of 6
    1kg of coal containing; C = 65%, H = 4%, O = 7%, N = 3%, moisture = 15% and remaining is ash. (molecular weight of air = 28.94g)
  (b) Define corrosion. Explain stress corrosion with appropriate diagram and 5
    examples.
  (c) Explain the effect of the following alloying elements on steel: 4
      (i) W
      (ii) MO
      (iii) Ni
      (iv) Cr.

3. (a) Explain the following factors affecting the rate of corrosion :– 6
      (i) position of metal in galvanic series
      (ii) temperature
      (iii) relative area of cathodic and anodic parts.
  (b) Define cracking. Explain catalytic cracking. Discuss fixed-bed catalytic cracking. 5
  (c) Explain the powder injection moulding method for compacting in powder metallurgy. 4

[TURN OVER

4. (a) What is Bio-diesel ? Explain the trans-esterification method for production   6
        of Bio-diesel from vegetable oil. What are its advantages ?
    (b) Explain structural composites.   5
    (c) Calculate the atom economy of the following reaction.   4

$$C_6H_6 + 4 \cdot 5O_2 \xrightarrow{V_2O_5} C_4H_2O_3 + 2CO_2 + 2H_2O$$
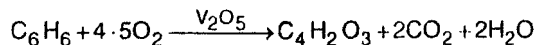
5. (a) Define catalysis. Explain the adsorption theory of hetergenous catalysis.   6
    (b) Define paints. Explain the different constituents of paints with their functions. 5
    (c) What are ceramic powders ? Explain manufacture of silicon carbide ceramic   4
        powder.

6. (a) Explain the traditional and green route for production of adipic acid.   6
    (b) Write a note on: Pillard Clays and Green solvents .   5
    (c) What are the methods of metallic coatings ? Describe metal cladding with   4
        appropriate diagram.

7. (a) Define catalyst. What are the types of catalyst ? What are the ideal   6
        characterisitcs of catalyst ?
    (b) 2.499 gms of coal sample was taken in silica crucible and heated in oven   5
        maintained at 110° C for one hour. The weight after heating was 2.368 gms.
        The same sample was analyzed for volatile matter and weight obtained was
        1.75g, the sample was further treated to get fixed weight of 0.95 gms. Calculate
        the percentage of moisture, volatile matter, ash and fixed carbon for this sample.
    (c) What are fibre-reinforced composties ?   4

Con. 8850-12.

KR-3600

(3 Hours) [Total Marks : 100

N. B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions out of **remaining**.

1. (a) Justify "Java language is 100% object orienteo programming language. 4
   (b) Explain shift operater by giving example. 4
   (c) Describe multidimensional array. 4
   (d) What is main Thread ? 4
   (e) Describe Applet Skeleton. 4

2. (a) Write a program to demonstrate the use of command line Arguments. 5
   (b) Write a program to add the list of items using vector and delete an item in the 5
       list according to user's choice.
   (c) What is difference between overloading and overriding ? 5
   (d) Describe AWT Classes. 5

3. (a) Write a program to display following tree :- 5

       * * * *

        * * *

         * *

          *

   (b) What is accessibility of the public method or field inside a non public class ? 5
   (c) Describe static keyword by giving example. 5
   (d) Write a program to demonstrate access protection in different packages. 5

4. (a) In a method invocation, does Java pass argument by reference or by value. 10
   (b) Describe constants in interfaces along with example. 5
   (c) How to use package and its naming convention ? 5

5. (a) Write a program to display wheather the inputted number is prime or not. 5
   (b) Describe throw and throws statement by giving example. 5
   (c) Write a program to create Thread by extending 'Thread Class'. 5
   (d) Write a program to check the font name and font size of string by passing 5
       parameters to applet.

6. (a) Write a program to open "note pad" using Java application program. 5
   (b) Write a program for matrix addition. 5
   (c) Write a program to demonstrate try and multiple catches. 5
   (d) What is meaning of monitor with respect to synchronization ? 5

7. (a) Wirte a program to demonstrate overloaded constructor. 5
   (b) Describe the different methods of vector class. 5
   (c) Write a program to demonstrate multiple inheritance. 5
   (d) List the names of packages along with its Classes and Methods. 5

F.E. Sem II (Rev) Dec - 2012
Sub - C.S.
13/12/12

2nd Half-12 mina-(d)-58

Con. 8979-12.

KR-3633

(2 Hours) [**Total Marks : 75**

N. B. : (1) Question No. 1 is **compulsory**.
(2) Answer any **four** of the **remaining** questions.
(3) Answers to **all** questions should be grouped **together**.
(4) **Figures** to the **right** indicate **full** marks.

1. (a) Explain the role of "Feedback" in the Communication process with suitable examples. 5
(b) (i) What are the different kinds of distances we observe during Communication Situations ? 5
(ii) Explain the importance of audio visual aids in oral presentation.
(c) Identify the sender, receiver, channel medium, message and feedback in the following Communication Situations :— 5
(i) A supervisor writes an application for leave to the manager, who does not grant him leave.
(ii) Ramesh sends an application letter for the post of Junior engineer and receives a call for the interview.
(iii) The Vice President of an organization instructs the assitant engineer via E mail to submit his project report within a week. The assistant engineer fails to submit the report.
(iv) The musician plays instrumental music in an auditorium and is appreciated by a big round of applause.
(v) The teacher summons the student to her cabin to give him some instructions. The student replies in the affirmative and leaves the cabin.

2. (a) Write short notes on (any **four**) :— 8
(i) Any two physical barriers to communication.
(ii) Demerits of Grapevine Communication.
(iii) Encoding and Decoding.
(iv) Significance of silence as a means of non-verbal communication.
(v) Importance of Horizontal Communication.
(b) You are the H. R. Manager and wish to purchase office furniture for your organisation. Write a letter inviting quotations to 'NORMAN FURNITURES' Mumbai and give full details of your requirements. (Use complete block form). 7

3. (a) Identity the barriers in the following situations :— 5
(i) Kishanlal never made mistakes in his accounts and was a very sincere worker. The Manager was puzzled when Kishenlal could not work with the new calculating machine and remained absent from work.
(ii) The lectures in the College had to be suspended because of the Loud music played by the Winning Political Party.
(iii) The Frenchman was unable to communicate with the Hindi speaking taxi driver.
(iv) The music concert had to be stopped due to electricity failure.
(v) The subordinates remained silent when the Chairman asked them to give their opinions on the new proposal.
(b) Compare and Contrast Oral and Written Communication. 3
(c) You are the Marketing head of "Bits and Bytes" Bangalore. You have received a letter inviting quotations for some new updated equipments for the computer laboratory. Draft a suitable reply and send the quotations. 7

4. (a) Give the diagrammatic representation of the Full block form. 3
(b) Write a short note on objectives of communication. 3
(c) Differentiate between caution and warning with suitable examples. 4
(d) Write a set of instructions for 'Welding'. (atleast 5) 5

[TURN OVER

5. (a) You are the proprietor of "Goodwill Furnitures". You have received an order of 50 office tables and chairs. But you are unable to execute the order because of shortage of workers. Draft a suitable adjustment letter in the semi block Form. 7

(b) Explain the following terms briefly (any **four**) :— 8

(i)	Kinesics	(v)	Voltmeter
(ii)	Paralanguage	(vi)	Chiseling
(iii)	Netiquettes	(vii)	Electrolysis.
(iv)	You attitude		

6. (a) Why is 'Listening' an important skill for effective communiction. 5

(b) State whether the following statements are true or false :— 4

    (i) Written Communication has a legal validity.

    (ii) Stage fright is a very rare phenomenon.

    (iii) Haptics is a nonverbal type of Communication.

    (iv) Grapevine Communication is related to gossips and rumors.

(c) Write the technical description of an 'Electric Iron' with a neat labeled diagram. 6

7. Read the passage given below and answer the questions that follow :—

To be a good teacher, you need some of the skills of a good actor. You must be able to hold the attention and interest of your audience ; you must be a clear speaker with a strong pleasant voice which you can control well. You must be able to act what you are teaching in order to convey its full meaning.

Watch a good teacher and you will see that she does not sit motionless before the class. She stands most of the time, she walks about, she uses her arms, hands and fingers to help in explanations, and her face to express feelings. Listen carefully, and you will hear the quality, the tone and the rhythm of the voice changing according to what she is speaking about.

Though the teacher needs and has some of the gifts of a good actor, it does not follow that the teacher can necessarily perform well on the stage. There are some important differences between the teacher's work and the actor's work. The actor has to speak words which he has learnt by heart, and repeat exactly the same words every time he plays that part. Even his movements and actions and expressions are fixed. What he has to do is to make these previously learnt words and actions appear natural on stage.

A good teacher works quite differetly. Her audience has to take an active part in the play ; they ask and answer questions ; if they do not understand something they ask for explanation. So teacher has to suit her act to the needs of the audience which is the class. She cannot learn her part by heart ; she has to invent as she goes along.

Many teachers who do a fine job in the classroom cannot act on the stage because their brains refuse to be limited to the words and part written by someone else and learnt by heart.

(a) (i) What skills of the actor does a teacher need ? 2

    (ii) How does a good teacher use her voice while teaching ? 2

    (iii) How does a teacher's audience participate in the "play" ? 2

    (iv) What does an actor have to do with his part when he is on the stage ? 2

(b) Summarise the passage in your own words and provide a suitable title. 7

ws-Con-2012

Con. 11024–12.

KR–3663

(3 Hours)

[Total Marks : 100

N. B . (1) Question No.1 is compulsory.

(2) Attempt any **four** questions out of remaining six questions.

(3) All dimensions in figures are in mm.

(4) Use your own judgment for any unspecified dimensions assuming suitable data if necessary.

(5) Use only **first** angle method of projection.

(6) Retain all construction lines.

(7) Use scale **1:1** only.

Q 1   Figure 1 shows front view and top view of the bracket, Draw the following views

(a) Sectional front view along A-A

(b) Top view   4

(c) R.H.S.V.   4

     Insert at least **8** major dimensions.   5

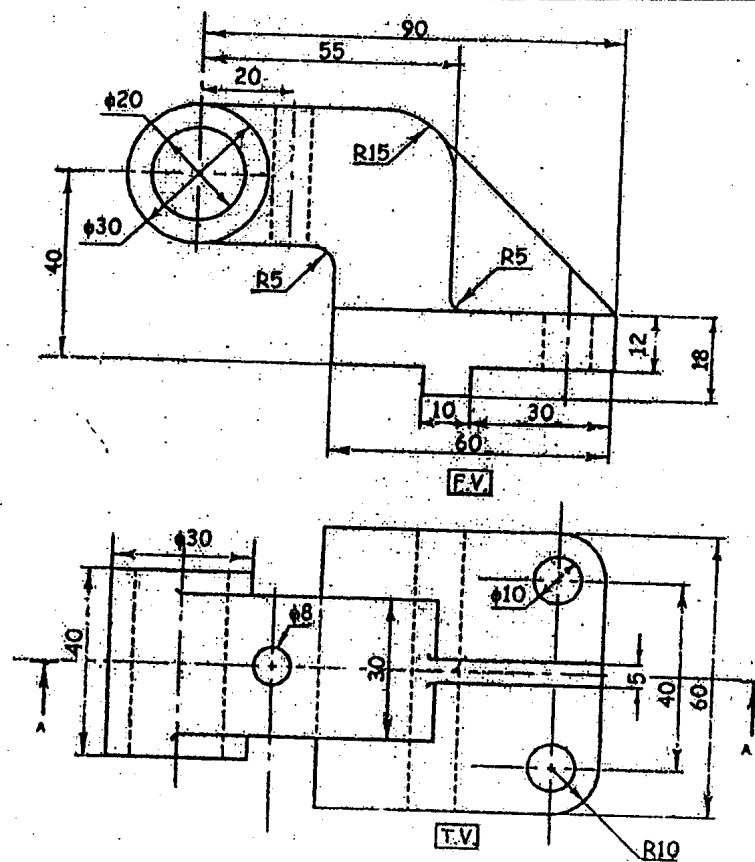   2

FIGURE 1

[TURN OVER

Q 2   Figure 2 shows a pictorial view of a machine part .Draw

(a) Sectional front view looking along the arrow X (section A-A)

5

(b) Top view

4
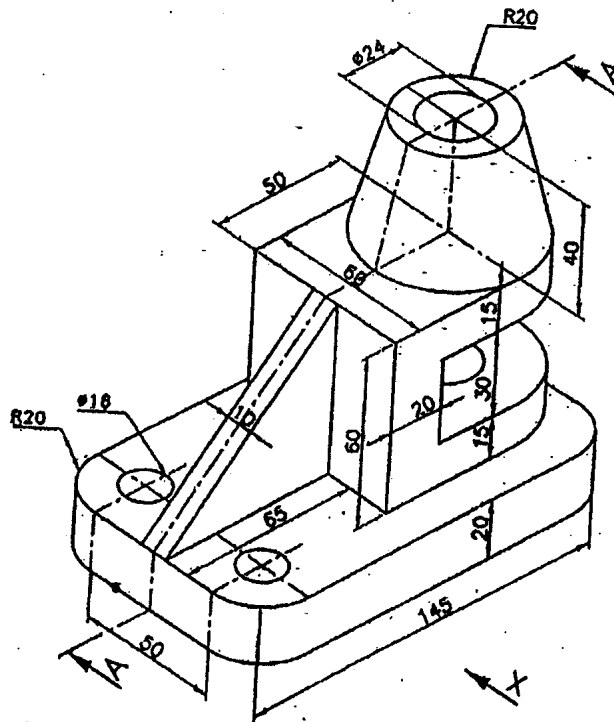
(c) L.H.S.V

4

Insert at least 10 major dimensions

2

FIGURE 2

Q 3 (a) The top view and the front view of a line AB measures 70 mm and 58 mm respectively. The line AB is inclined at an angle of 35⁰ to the H.P. The end A is 15 mm above the H.P.and 12 mm infront of the V.P .The other end B is also in the first quadrant. Draw the projections of line AB and find its true length and true inclination with the V.P.

8

(b) The distance of a focus from the directrix is 50 mm A point moves in such a way that the eccentricity is equal to 3/2 .Draw the locus of the point and name the curve also draw tangent and normal at any point on the curve.

7

Q 4   A pentagonal pyramid 35mm base edges and 70 mm height is resting on H.P. with one of its triangular surface perpendicular to H.P. and parallel and nearer to V.P Draw its projections   15

Q 5 (a) A hexagonal pyramid of 25 mm edge of the base and axis 50 mm long is resting on its triangular face in H.P. with the axis parallel to the V.P. It is cut by a section plane perpendicular to the H.P. inclined at 30^0 to the V.P. and passing through a point on the axis 20 mm from the base . Draw top view, sectional front view and true shape of the section when the apex is removed.   12

   (b) Draw neat, proportionate free hand sketches of the following :–

   (i) Acme thread profile

   (ii) Hexagonal headed bolt

                                                    1

                                                    2

Q 6   A cone of diameter of base 90 mm and height 90 mm stands vertically on its base in H.P. A semicircular hole of diameter 60 mm is cut through the cone, the axis of the hole is horizontal and intersects the axis of cone and is 35 mm above the base of the cone. The flat face of the hole contains the axis of the cone and is   perpendicular to V.P. Draw the development of the cone with hole.

                                                    15

Q 7 (a) Draw neat, proportionate free hand sketches of the following:–

   (i) Square nut.

   (ii) Eye Foundation Bolt

                                                    1

                                                    2

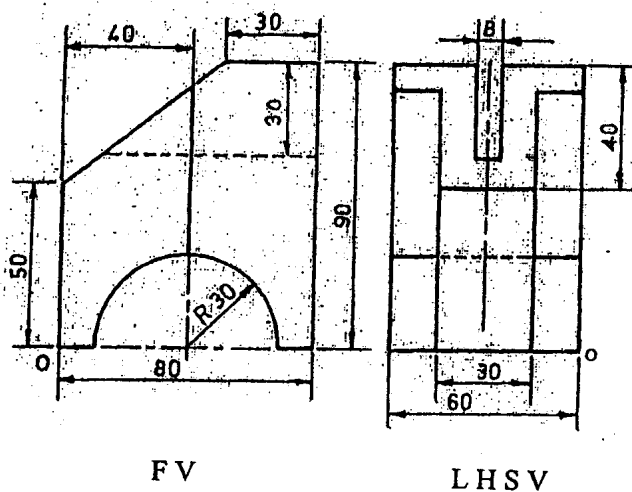   (b) Figure 3 shows two views of an object. Draw isometric view of the object.   12

F V   L H S V

FIGURE 3