

Q. 4 a) Show that the length of the curve $x = a e^{\theta} \sin \theta$ $y = a e^{\theta} \cos \theta$ from (6)

$$\theta = 0 \text{ to } \theta = \pi/2$$

b) Solve $\frac{d^2 y}{dx^2} - y = \cos x \cosh x + a^x$ (6)

c) Using fourth order Runge-Kutta method, solve numerically, the (8)

differential equation $\frac{dy}{dx} = x^2 + y^2$ with the given condition $x = 1$,
 $y = 1.5$ in the interval $(1, 1.2)$ with $h = 0.1$

Q. 5 a) Use method of variation of parameters to solve (6)

$$\frac{d^2 y}{dx^2} + y = 3x - 8 \cot x$$

b) Using Taylor's series method, obtain the solution of (6)

$\frac{dy}{dx} = y - xy$, $y(0) = 2$. Find the value of y for $x = 0.1$ correct to
 four decimal places

c) Evaluate $\int_{-1}^1 \frac{dx}{1+x^2}$ by using (i) Trapezoidal Rule, (ii) Simpson's (8)
 $(1/3)^{\text{rd}}$ Rule and (iii) Simpson's $(3/8)^{\text{th}}$ Rule. Compare the result with
 exact solution.

Q. 6 a) In a circuit of resistance R , self inductance L , the current i is given (6)

by $L \frac{di}{dt} + Ri = E \cos pt$ where E and p are constants. Find the
 current i at time ' t '

Find the area bounded by the parabola $y = 4x - x^2$ and the line (6)

$$y = x$$

Find the volume of the paraboloid $x^2 + y^2 = 4z$ cut off by the (8)

plane $z = 4$.

Duration: 2 hours

Total Marks: 60

- NB** 1 Question no 1 is compulsory.
 2 Attempt any three questions from Q.2 to Q.6
 3 Use suitable data wherever required.
 4 Figures to the right indicate full marks.
- Q1** Attempt any five of the following. 15
- How will you test the optical flatness of surface by interference?
 - What is dispersive power? Write the formula for dispersive power of diffraction grating
 - Calculate the refractive indices of core and cladding material of a fiber from following data, $NA = 0.22$ $\Delta = 0.012$
 - Explain the terms: i) Metastable states. ii) Pumping iii) Population inversion
 - How do you measure phase difference between two A.C. signals by CRO?
 - Why is the wave nature of De-Broglie wave not apparent to daily life?
 - How can Maglev train have very high speed?
- Q2** a Show that diameter of Newton's nth dark ring is proportional to the square root of natural number. In Newton's ring experiment the diameter of 5th dark ring is 0.336cm and that of 15th dark ring is 0.590 cm. Calculate the radius of curvature of Plano convex lens if wavelength of light used is 5890\AA 4+4
- b What are the advantages of optical fiber? Explain the use of optical fiber in communication system. 7
- Q3** a What is Holography? Explain the construction and reconstruction of Hologram with neat diagram 8
- b Explain the interference in thin film of constant thickness and derive the conditions of maxima and minima for interference. 7
- Q4** a Calculate the maximum order of diffraction maxima seen from plane transmission grating having 2500 lines per inch if light of wavelength 6900\AA falls normally on it 5
- b Derive Schrodinger's time independent equation 5
- c Explain the phenomena of superconductivity? Show that in superconducting state the material is perfectly diamagnetic. 5
- Q5** a A grating has 6000 lines per cm. Find the angular separation between two yellow lines of mercury of wavelengths 5770\AA and 5791\AA in the second order. 5
- b Show that the energy of an electron in a box varies with square of natural number. 5
- c Explain the construction and working of Atomic Force Microscope. 5
- Q6** a With single slit electron diffraction experiment prove Heisenberg's uncertainty principle 5
- b Explain the magnetostatic focusing system and calculate the pitch of helix 5
- c What is top down and bottom up approach of preparing nanomaterials. Explain one of the methods on detail. 5

Sem:-II- (CBSEGS) / Applied Chemistry-II

Nov. 2017

Q.P.CODE: 25996

[Time: 2 Hours]

[Marks:60]

Please check whether you have got the right question paper.

- N.B:
1. Question no. 1 is compulsory.
 2. Attempt any three from remaining five questions.
 3. Atomic weights: - H=1, C=12, N=14, O=16, S=32, Cl=35.5, Ba=137.5, mg=24, Na=23, Ca=40.

- Q.1 Answer Any Five from the following:- 15
- a) What is metal cladding? How is 'Alclad' obtained.
 - b) Define fuels. Classify them with examples.
 - c) Give the composition, properties and uses of wood's metal.
 - d) What are composites? What are their advantageous characteristics?
 - e) What are green solvents? Give two Industrial applications of green solvents.
 - f) By kjeldahl's method 1.5 gm of coal sample was analysed. The ammonia evolved was absorbed in 50 ml of 0.1 N H_2SO_4 . After absorption, the excess H_2SO_4 required 34ml of 0.1N NaOH for neutralization. Calculate the percentage of Nitrogen.
- Q.2 a) How do the following factors affect the rate of corrosion? 06
- i) Purity of metal.
 - ii) Over voltage.
 - iii) Relative areas of anodic and cathodic parts.
- b) What is cracking? Explain fixed bed catalytic cracking with neat labelled diagram. 05
- c) Calculate the % Atom economy for the following reaction with respect to methyl-isocyanate. 04
- $$CH_3NH_2 + COCl_2 \rightarrow CH_3N=C=O + 2HCl$$
- Methylamine methyl-isocyanate
- Q.3 a) The composition of gas was found to be $H_2=10\%$, $C_2H_6=16\%$, $CH_4=20\%$, $CO=18\%$, $CO_2=22\%$, $O_2=8\%$, $N_2=6\%$. 06
Calculate the volume of air required for complete combustion of $1m^3$ of this gas.
- b) Explain conventional and greener route for synthesis of Adipic Acid. Highlights the green chemistry principle involved. 05
- c) What are metallic coatings? Distinguish between Galvanizing and Tinning. 04
- Q.4 a) What are the effect of following alloying elements on steel? 06
- i) Ni ii) Cr iii) Co iv) Mn v) Mo vi) W
- b) Explain differential aeration corrosion with the help of a suitable example. 05
- c) What is green chemistry? List the 12 principles of green chemistry. 04
- Q.5 a) What is petroleum? Describe the refining of petroleum with the help of a diagram 06
- b) What are structural composites? Give their types and applications. 05
- c) Distinguish between Brass and Bronze 04
- Q.6 a) Define an Alloy What is the purpose of making alloys? 05
- b) Define paints. Mention any four constituents of paints and state functions of each constituents. 05
- c) A coal sample contains C=65%, H=13%, O=6%, S=4%, N=12%, calculate the minimum amount of air needed for Complete combustion of 2kg of coal. 05

2

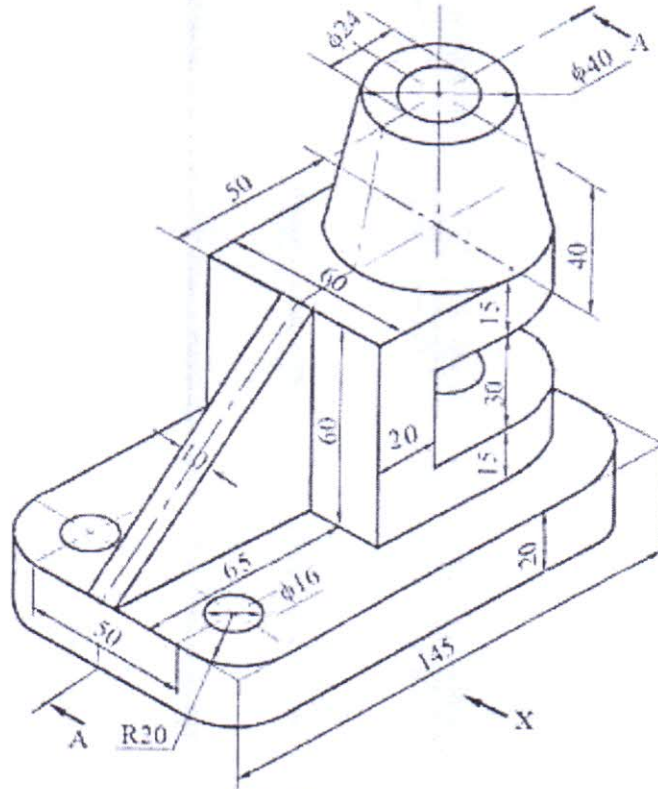


Fig.2

3. A pentagonal pyramid of 30mm edge of base and 65mm length of axis has a 30mm edge on the HP. The axis is inclined at 30° to HP, and 45° to VP. Draw the projections. 15
4. (a) A cylinder of base diameter 50 mm and height 70 mm is resting on one of the base point on H.P. with axis inclined at 45° to H.P. parallel to V.P. Draw its projections. 6
- (b) Draw an isometric view of the following object using natural scale. 9

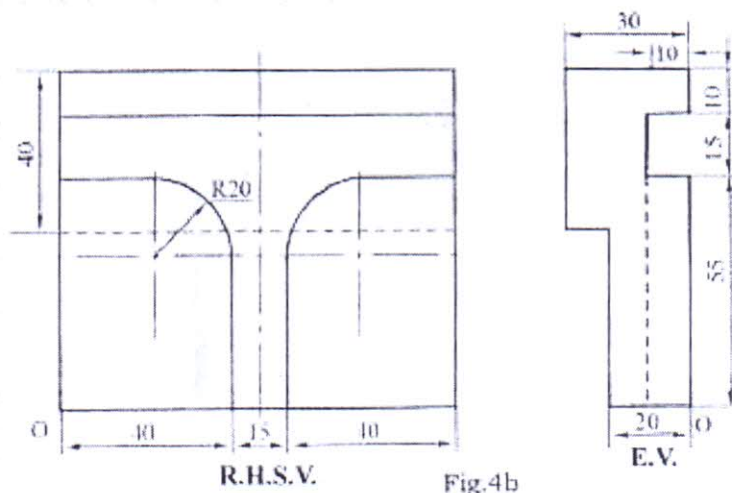


Fig.4b

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5. A right circular cone of diameter 60 mm and length of axis 65 mm is resting on HP on its base. It is cut by a cutting plane perpendicular to VP and inclined to HP such that the true shape is a parabola of height 50mm. Draw FV, sectional TV and the true shape of section. 15
6. (a) A line AB 90mm long is inclined at an angle of 30° to HP and 45° to VP. Its end point 'A' is 15mm above HP and 20mm in front of VP. Draw the projections when point 'B' is in the third quadrant. 9
- (b) Draw an isometric view of the following object using natural scale. 6

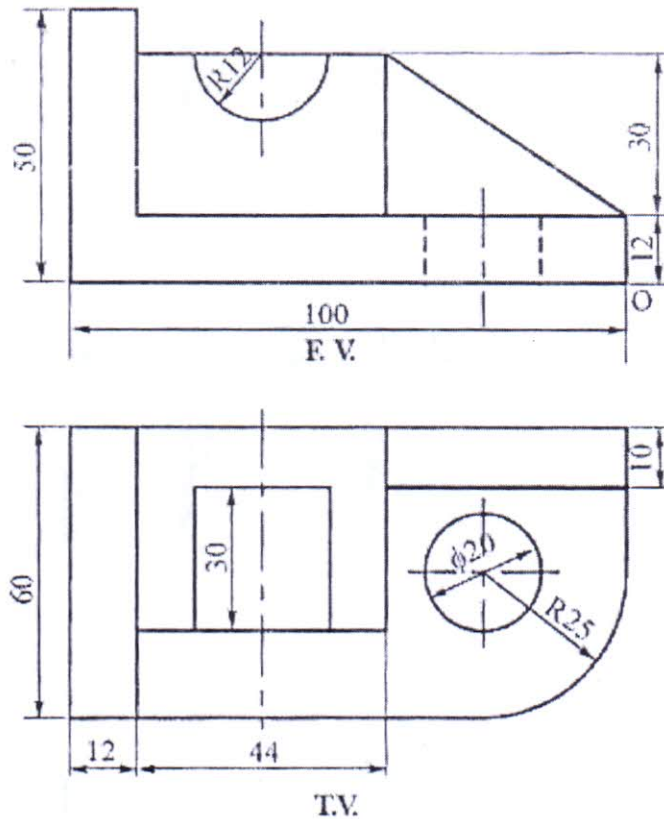


Fig.6b

Sem-II - (CBSEs) / Structured Programming Approach / Dec-2017

Q.P. Code :18549

(Time: 3 Hours)

[Max. Marks 80]

Please check whether you have got the right question paper.

N.B

- (1) Question no. 1 is compulsory.
- (2) Attempt any 3 from the remaining questions.
- (3) Assume suitable data if necessary.
- (4) Figures to right indicate full marks.

- Q1(a) List and explain the symbols used in a drawing a flowchart. 05
- Q1(b) Compare switch control statement with if-else ladder. 05
- Q1(c) Explain with example significance of continue, break, goto and return statements. 10
- Q2(a) WAP to cyclically rotate the elements of an array. Program should accept a choice in which direction to rotate - left or right. Depending on the choice it should perform cyclic permutation. 10
Left rotation: $i/p=\{1,2,3,4,5\}$ $o/p=\{2,3,4,5,1\}$
Right rotation: $i/p=\{1,2,3,4,5\}$ $o/p=\{5,1,2,3,4\}$
- Q2(b) Explain Recursion. WAP using recursive function 'power' to compute x^n 10
$$\begin{aligned} \text{power}(x,n) &= 1 && \text{if } n=0 \\ \text{power}(x,n) &= x && \text{if } n=1 \\ \text{power}(x,n) &= \text{power}(x, n-1) && \text{otherwise} \end{aligned}$$
- Q3(a) WAP to find trace and norm of a square matrix. 10
Note: Trace: Sum of diagonal elements of a square matrix
Norm: Square root of sum of the squares of all the elements of the matrix.
- Q3(b) What is FILE? What are different modes in which file can be opened? What are the different functions available to read and write to file? 10
- Q4(a) WAP for solving the following series. 7
$$S = x - x^3/3! + x^5/5! - x^7/7! + \dots x^n/n!$$
- Q4(b) What is a pointer? Explain how the pointer variable declared and initialized and Comment on size of pointer variable. 3
- Q4(c) What is an operator? Explain the arithmetic, relational, logical, bitwise and assignment operators in C language with examples. 10
- Q5(a) Define structure Employee with following details 10
(i) Employee code
(ii) Employee name
(iii) Employee salary
(iv) Employee date of joining (dd/mm/yyyy) (Note: Use nested structure)
Write a program to read atleast 10 records of employees and display them in ascending order of employee code.
- Q5(b) Explain storage classes with examples. 10

- Q6 (a) What is function? What are function parameters? Explain parameters passing techniques with examples. 10
- Q.6(b) Write user defined functions for following string operations 10
- To copy one string to another
 - To compare one string with another
