Q.P. Code :26383

[Time: 2 Hours] **[Marks:40]**

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. Figures to the right indicate full marks.

Q.1	a)	"Communication is a key to success." Explain the process of communication with a labeled diagram	2
	b)	Identify the sender, message, receiver, medium /channel in the following situation: A traffic police stops a biker and fines him Rs.100 for not wearing a helmet	2
	c)	Explain: 'hearing is natural, listening requires efforts'.	2
	d)	Give a diagrammatic representation of a letter in complete-block format.	2
	e)	Differentiate between :warning and caution	2
Q.2	a)	Explain advantages and disadvantages of nonverbal communication.	2
	b)	Explain any two means of overcoming psychological barriers in an organization.	2
	c)	Your shop, Graphic Displays has received an enquiry letter from a college regarding display boards, racks, white boards and black boards. Draft the quotation letter to be sent to the Principal of the college. (Use Modified Block Format)	6
Q.3	a)	Name and explain vertical communication	3
	b)	What do the following non-verbal cues communicate: i) Closed eyes ii) Pointing finger	1
	c)	A majority of the computers and peripherals that you had ordered for your new office have been received in a damaged condition. Draft a suitable complaint cum claim letter asking for appropriate compensation from the supplier	6
Q.4	a)	Identify the barrier:	2
	i)	Villagers are not able to follow the politician's speech because it is in English.	
	ii)	A boss commenting that all calculations are wrong because it has been done by a lady.	
	b)	What is Body Language? How it can be interpreted?	4
	c)	Describe the process of titration.	4
Q.5	a)	Write short notes on i) Grapevine ii) You attitude	3
	b)	Differentiate between skimming and scanning.	2

c) Match the following: 3

a)	Full block form	(i)	Logo/Emblem
b)	FB/104/07	(ii)	Principle
c)	Letter head	(iii)	No indents.
d)	Enclosure	(iv)	Dear Sir
e)	Salutation	(v)	Reference number
f)	Consideration	(vi)	Attachment

d) Make sentence with the following pair of words so as to differentiate between their meanings: i) 2

i)except-accept ii) cereal-serial

Q.6 a) A Read the following passage carefully and answer the questions given: 5

Education has always had two objects: on the one hand, to give skill; and on the other, to impart a vaguer thing which we may call wisdom. The role of skill has become very much larger than the role of wisdom. At the same time it must be admitted that wisdom in our world is useless expect for those who realize the great part played by skills, for it is increase of skill that is the distinctive feature of our world.

Although scientific skill is necessary, it is by no means sufficient. A dictatorship of man of science would very soon become horrible. Skill without wisdom may prove to be surely destructive. For this reason, if for no other, it is of great importance than those who receive a scientific education should not be merely scientific, but should have some understanding of that kind of wisdom which, if it can be imparted at all, can be imparted by the cultural side of education. Science enables us to know the means to any chosen end, but it does not help us to decide upon what ends should be pursued. If you which to exterminate the human race, it will show you how to do it. If you wish to make the human race so numerous that all are on the verge of starvation, it will show you how to do that. If you wish to secure adequate prosperity for the whole human race, science will tell you what you must do. But it will not tell you whether one of these ends is more desirable than other. Nor will it give you that instinctive understanding of human beings that is necessary if your measures are not to arouse fierce opposition which only ferocious tyranny can quell. It can't teach you patience, it can't teach you sympathy, it can't teach you a sense of human dignity. These things, insofar as they can be taught in formal education, are most likely to emerge from the learning of history and great literature.

1) What should, according to the writer, be the aim of education?
2) Why is increase of skill a distinctive feature of our world?
3) What danger does the writer see in the present emphasis on imparting skills?
4) What knowledge does science impart to us?
5) Why should we study history and great literature?

b) Describe any ONE of the following objects giving definition, diagram, components & working of calculator , mobile phone 3

c) Use one word for the following statements. 2

i) Words which have the same meaning

ii) A person with a positive approach

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Time : 3 Hrs **Marks: 80**

Please check whether you have got the right question paper.

N.B:

1. **Question No.1 is compulsory**
2. **Answer any three out of remaining five questions**

Q. 1 a. What is an algorithm? Explain properties of an algorithm. 04

b. What are different data types in C? 04

c. Compare break and continue. 04

d. Explain any two functions from math.h 04

e. Define pointers in C? Explain the terms: address operator and pointer variables. 04

Q. 2 a. Write a program to find largest and smallest element in an array. 10

b. What is Recursion? Write a program to display n terms in Fibonacci series using recursion. 10

Q. 3 a. Write user defined function to reverse a given string. 05

b. Write a program to print following pattern. 05

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

c. Explain the concept of call by value and call by reference with example. 10

Q. 4 a. What is use of storage classes? Explain different storage classes in C. 10

b. Write a program to calculate sum of n terms in following series. 10

$$1 + x/3! - x^2/5! + x^3/7! - x^4/9! + \ldots\ldots\ldots$$

Q. 5 a. Write a program to take nxn matrix as input and display addition of column elements of matrix. 10

b. Write the output of following program segment 06

A.
```
main()
{
 int i;
 int z=8;
 i=!z>10;
 printf("i=%d",i);
 }
```

B.
```
main()
{
 int x=9,y=2;
 float c;
 c=x/y;
 printf("\n%f",c);
}
```

c. Explain the ternary operator in C. 04

Q. 6 a. Compare structure and union. Write a program to create structure for storing 10 students details such as name, roll number and marks. Display the student details in ascending order of marks. 10

b. Explain file handling in C with respect to the various modes for opening files, read and write operation. 10

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Duration – 3 Hours **Total Marks : 80**

(1) N.B.:- Question no 1 is compulsory.

(2) **Attempt any THREE questions out of remaining FIVE questions.**

1)a) Evaluate $\int_0^{\infty} \frac{dx}{(a^2 + x^2)^5}$ (4)

b) Find the particular integral of $(D + 2)y = x^2$ (3)

c) Solve $(\sin x \cos y + e^{2x})dx + (\cos x \sin y + \tan y)dy = 0$ (3)

d) Express the following integral in polar co-ordinates: (4)

$$I = \int_0^4 \int_y^{4+\sqrt{16 - y^2}} f(x, y)\, dxdy$$

e) Prove that $E = 1 + \Delta$ (3)

f) Evaluate $I = \int_0^{\pi/2} \int_0^{3(1-\cos t)} x^2 \sin t \, dx \, dt$ (3)

2 a) Solve $\frac{dy}{dx} - xy = y^2 e^{-\left(\frac{x^2}{2}\right)} \log x$. (6)

b) Change the order of integration and evaluate $I = \int_0^1 \int_1^{\sqrt{2-y^2}} \frac{y \, dy \, dx}{\sqrt{(2 - x^2)(1 - x^2 y^2)}}$ (6)

.

c) Evaluate $\int_0^{\pi} \frac{dx}{a + b \cos x}$ a > 0, |b| < a. Hence show that (8)

$$\int_0^{\pi} \frac{dx}{(5 + 4 \cos x)^2} = \frac{-4\pi}{27}$$

3 a) Evaluate $I = \int_0^{\log 2} \int_0^{x} \int_0^{x + \log y} e^{x+y+z} dx \, dy \, dz$ (6)

b) Find the area between the circles $x^2 + y^2 - 4ax = 0$ and $x^2 + y^2 - 2ax = 0$ (6)

c) Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 5y = \sin \log x$ (8)

4 a) Find the total length of the curve $x = a e^{\theta} \sin \theta$, $y = a e^{\theta} \cos \theta$ from $\theta = 0$ to $\theta = \frac{\pi}{2}$ (6)

b) Solve $(D^2 - 3D + 2)y = \frac{1}{e^{(e-x)}} + \cos\left(\frac{1}{e^x}\right)$ (6)

c) Use Runge-Kutta method of fourth order , compute y(0.2) given $y' + y + xy^2 = 0, y(0) = 1$ by taking h = 0.1 correct to 4 decimal point. (8)

5 a) State duplication formula and prove that $\sqrt{\frac{1}{4}}\sqrt{\frac{3}{4}} = \sqrt{2}\,\pi$ (6)

b) Using Taylor's series method, obtain the solution of the differential equation $y' = y - xy, \quad y(0) = 1$ (6)

c) Find the volume bounded by the paraboloid $z = 4 - x^2 - \frac{y^2}{2}$ and the plane $z = 0$. (8)

6 a) A chain coiled up near the edge of a smooth table starts to fall over the edge. The velocity v when a length x has fallen is given by $x v \frac{dv}{dx} + v^2 = gx$. Show that $v = 8\sqrt{x/3}$ (6)

b) Find the mass of a plate I the form of a cardioid $r = a(1 - \cos\theta)$ if the density at any point of the plate varies as its distance from the pole. (6)

c) Evaluate $\int_{-3}^{3} x^4\,dx$, using (i) Trapezoidal Rule (ii) Simpson's (1/3)rd rule. Compare it with exact solution. (8)

Time: 2 Hours **Marks: 60**

N.B. 1)Question no 1 is compulsory.
2)Attempt any three questions from the remaining questions.
3)Assume suitable data and symbols if required.
4)Figures on the right indicate full marks.

Q.1) Attempt any five

a) Why are Newton's rings circular & why is the centre of interference pattern dark? (3)

b) If the number of lines on the grating surface is increased, what will happen to its resolving power? Explain with necessary formula. (3)

c) Compare stimulated emission with spontaneous emission. (3)

d) Proton is 1836 times heavier than that of electron. If the kinetic energy of the proton is 8.19×10^{-14} J find the de-Broglie wavelength associated with that of proton. (3)

e) The critical field of niobium is 10^5 A/m at 8 K and 2×10^5 A/m at 0K. Calculate critical temperature of the element. (3)

f) How is an electron microscope different from optical microscope. (3)

g) How will you measure of frequency of AC signal using cathode ray oscilloscope? (3)

Q.2) a) What is antireflection coating? Derive amplitude and phase condition for it.
The diameter of a bright ring in Newton's rings experiment was observed to decrease from 2.3 cm to 2.0 cm when air was replaced by liquid in the gap between curved surface of plano convex lens and glass plate. Determine the RI of the liquid. (8)

b) What is index profile in optical fibre? How will you classify optical fibres based on it? The numerical aperture of an optical fibre is 0.2 when surrounded by air. Determine the RI of its core given the RI of cladding as 1.59. Also find the acceptance angle when it is in a medium of RI 1.33. (7)

Q.3) a) Draw energy level diagram of Nd-YAG laser. Explain the working of it by mentioning the active centres, metastable states, type of pumping, the wavelengths emitted out in this laser. Why is the diameter of a tube made elliptical? (8)

b) Show that in wedge shape film the fringe width $\beta = \lambda/2\mu\theta$ where θ is the angle of wedge. White light falls normally on a soap film of thickness 4×10^{-5} cm and of refractive index 1.33. Which wavelength in the visible region will be reflected most strongly? (7)

Q.4 a) Calculate the angular separation between the first order minima on either side of central maxima when slit is 6×10^{-4} cm wide and $\lambda = 6000$ A°. (5)

b) Explain single slit electron diffraction experiment to verify uncertainty principle. (5)

c) Explain the terms critical temperature, critical magnetic field and critical current in superconductivity. (5)

Q.5 a) A diffraction grating which has 4000 lines per cm is used at normal incidence. Calculate the dispersive power of the grating in the third order spectrum in the wavelength region 5000 A.U. (5)

b) What do you mean by a particle in a box? What are its boundary conditions? Show that the energy of an electron in the box varies as the square of natural number. (5)

c) With Schematic diagram of Scanning Electron Microscope, explain its principle and working. (5)

Q.6 a) The position and momentum of 0.5 KeV electron are simultaneously determined. If its position is located within 0.2nm, what is the percentage uncertainty in its momentum? (5)

b) Explain the working of CRO with block diagram. (5)

c) What are the nanomaterials? Explain any two methods of preparation of nanomaterials. (5)

(Time: 2 Hours) **[Marks:60]**

N.B. 1) Question **No1** is **compulsory**.

2) Attempt **any three** questions from remaining **five** questions.

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

4) Atomic wt: Al=27,Ca=40,S=32,Cl=35.5,Fe=56,K=39,C=12,N=14,O=16,Na=23,Mg=24

Q1) Attempt **any five** of the following 15

(a) Define Fuel.Why a good fuel must have low ash content?
(b) Name the different methods of applications of metallic coatings. Explain metal cladding.
(c) A sample of coal contains C=66%,O=28%,H=4%,S=1.5%,N=0.8% and ash=0.2%.Calculate the G.C.V and N.C.V of the coal.
(d) Give the composition, properties and uses of Gun metal .
(e) Explain ' Design for Energy Efficiency' principle of Green Chemistry.
(f) Give the functions of matrix phase.
(g) State the characteristics of a good paint.

Q2) (a) With a suitable diagram explain electrochemical mechanism of rusting of iron in neutral aqueous medium. 06

(b) (i) 0.5gm of coal sample was burnt in Bomb Calorimeter experiment produced 0.06gm of $BaSO_4$ .Calculate percentage of Sulphur. 03

(ii) What are Green solvents? Give two industrial applications of Green solvents. 02

(c) Write a short note on 'Sandwich Panel' .Mention their applications. 04

Q3) (a) What is Cracking. With the help of diagram explain Fixed Bed Catalytic cracking. 06

(b) (i) Differentiate between Brass and Bronze. 03

(ii) Define Stress corrosion with an example. 02

(c) Calculate the % atom economy of the following reaction w.r.t the product Allyl Chloride. 04

$$CH_3\text{-}CH=CH_2 + Cl_2 \rightarrow Cl\text{-}CH_2\text{-}CH=CH_2 + HCl$$

Allyl Chloride

Q4) (a) How do the following factors affect the rate of corrosion: 06

(i) Passive character of metal

(ii) pH of medium

(iii) Purity of metal

(b) (i) What is Green Chemistry .Give its significance. 03

(ii) Define the following: a) Matrix Phase b) Dispersed Phase 02

(c) Write a short note on Shape memory alloy. 04

Q5) (a) Calculate weight and volume of air required for complete combustion of $1m^3$ of gaseous fuel which possess by volume ; CH_4= 35%,C_2H_4= 5% , CO=15%, H_2= 40%,N_2=1%, watervapour = 4%. (Molecular weight of air = 28.949) 06

(b) (i) Explain Galvanic corrosion with a neat labeled diagram. 03

(ii) What is meant by cracking of petroleum. 02

(c) Explain conventional and Green route of manufacturing of Carbaryl. By this reaction which principle of Green Chemistry is shown. 04

Q6) (a) What is Powder metallurgy? Explain Injection moulding method of compaction 06

(b) (i) Explain characteristics of composite materials. 03

(ii) Define Paint? Give any 2 functions of Thinners. 02

(c) Explain the determination percentage of Moisture content in the coal sample. Give its significance. 04

(3 Hours) **[Total Marks: 60]**

N. B. – 1. **Attempt any four questions.**

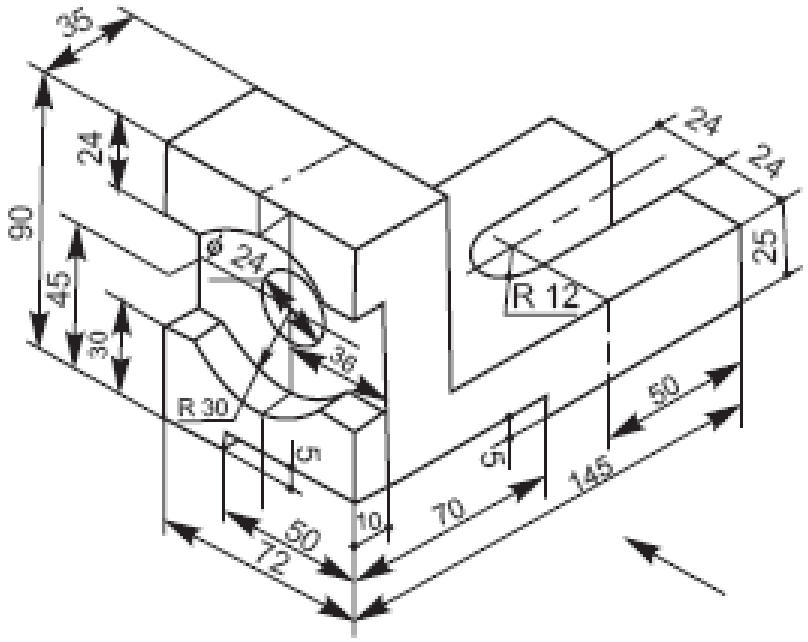
2. Use first angle method of projection, unless mentioned otherwise.
3. Write all answers on drawing sheets only & use both sides of the sheets.
4. Use your own judgment for any unspecified dimension.
5. Retain construction lines.
6. All dimensions are in mm.

Q.1 (a) A stick is 130 mm long is initially tangent to semicircle of 80 mm diameter at its left side corner. This stick now rolls over the circumference of semi circle without slipping. Draw the locus of the end point of the stick, which is away from the semicircle and name the curve. ***(06)***

(b) For the object shown in figure draw the following views -

(i) Front view in the direction of arrow. ***(05)***

(ii) Top view. ***(04)***



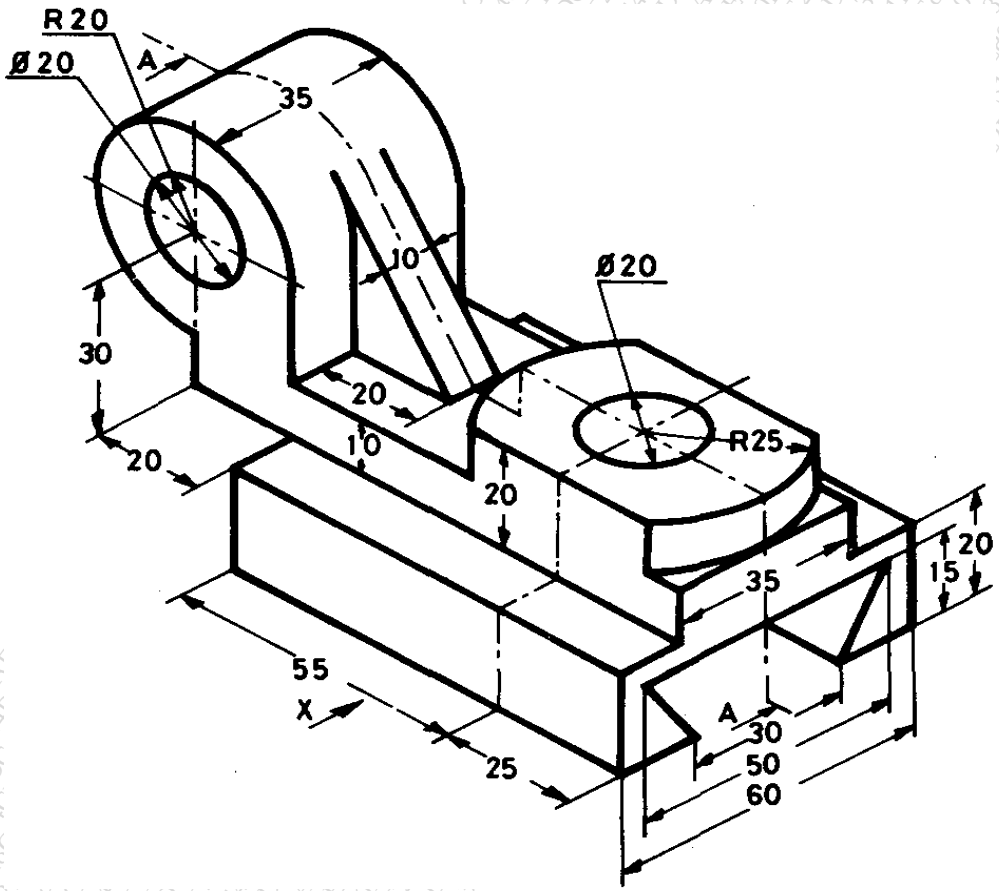
Q. 2 For the object shown in figure draw the following views –

i. Sectional front view from X direction section along A-A. ***(04)***

ii. Side view from Right ***(04)***

iii. Top view ***(05)***

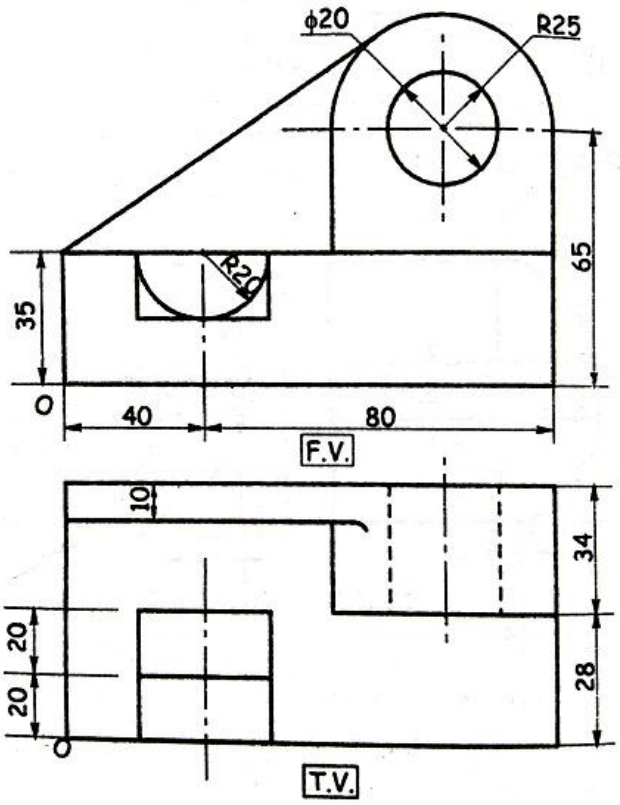
iv. Insert the major dimensions ***(02)***



Q. 3 A pentagonal pyramid, side of base 35 mm and axis 70 mm long, is lying on one of its corner on the HP such that the triangular surface opposite to the corner is parallel to HP and perpendicular to VP, and base edge containing that triangular surface is parallel to both the HP and VP. Draw the projections of the solid when the apex of the pyramid is nearer to the observer. ***(15)***

Q. 4 (a) A cylinder of 50 mm diameter of base and 70 mm length of an axis has resting on one point of the circumference in VP. Draw its projections if one of the generators is inclined at 30^0 to VP and parallel to HP. ***(06)***

Q. 4 (b) Figure shows three views of an object. Draw its isometric view with 'O' as origin. ***(09)***



Q. 5 A pentagonal pyramid side of base 40 mm and height 80 mm is resting on HP on its base with one of the edge of base parallel to VP and away from VP. It is cut by an AIP bisecting the axis, the distance of the section plane from the apex being 13 mm, if the apex portion is removes, draw the elevation and sectional plan of the pyramid and show the true shape of the section. Also draw the development of the lateral surface of the remaining part of the pyramid ***(15)***

Q. 6 **(a)** The F.V. of 85 mm long straight line AB measures 60 mm while its T.V. measures 70 mm. Draw the projection of AB if its end A is 10 mm above HP and 20 mm behind VP. while its end B is in first quadrant. Draw the projections of line and determine the inclination of line AB with the reference planes. ***(09)***

(b) Figure shows two views of an object. Draw its isometric view with 'O' as origin. ***(06)***