Q. P. Code : 50063

(REVISED COURSE)

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

N.B.
1. Question No. 1 is compulsory.
2. Answer any Three questions out of remaining Five questions.
3. Use only Drawing Sheets for answering.
4. Use your judgement for any unspecified diminution.
5. Use First Angle Method of projection only.
6. Retain all construction Lines.

Q.1   a.   A circle of 60mm diameter rolls along a straight line without   (6)
           slipping, draw the curve traced by a point 'P' on the circumference
           of the circle for one complete revolution.

      b.   The pictorial view of a machine part is given in Fig.1b Draw
           (i) Front View in the direction of 'X'   (4)
           (ii) Top View.   (4)
           (iii) Insert at least 10 major dimensions.   (1)

Fig.1b   Fig.2

Q.2   Fig.2 shows a pictorial view of a machine part, Draw:
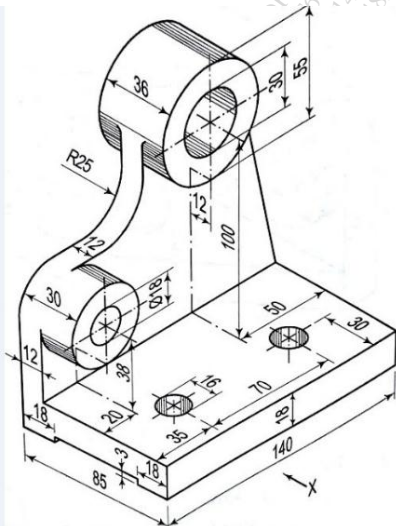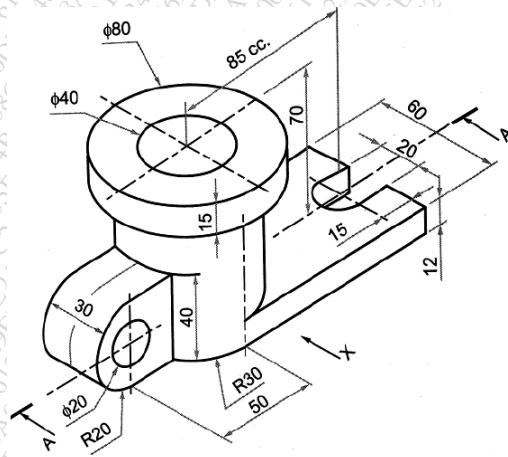   (a) Sectional Front View looking along 'X' (Section A-A)   (5)
           (b) Top View   (4)
           (c) LHSV   (4)
           (d) Insert at least 10 major dimensions.   (2)

Q.3   A hexagonal pyramid of 30mm edge of base and 70mm length of   (15)
           axis has base edge on the HP. The axis is inclined at 30° to HP.
           and 45° to VP. Draw the projections.

Q.4   a.   A cylinder of base diameter 50mm and height 60mm is resting on a   (6)
           point on base circle on H.P. with axis inclined at 30° to H.P. Draw
           its projections.

TURN OVER

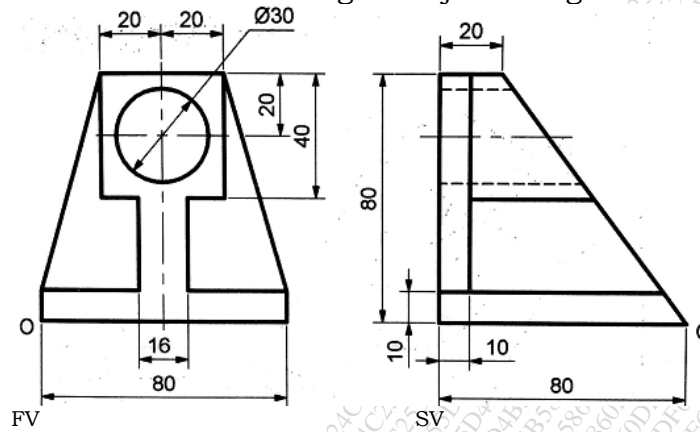b. Draw an isometric view of the Fig.4b object using natural scale. (9)

Fig.4b

Q.5 A cone base 50mm diameter and axis 65mm long is resting on its (15) base on the H.P A section plane perpendicular to V.P and inclined at 45⁰ to H.P cuts the cone, bisecting its axis. Draw front view, sectional top view, sectional side view and the true shape of the section and also draw its development of lateral surface.

Q.6 a. A line AB 70mm long is inclined at an angle of 30⁰ to HP and 45⁰ to (9) VP. Its end point 'A' is 20mm above HP and 25mm in front of VP. Draw the projections when point 'B' is in the first quadrant.

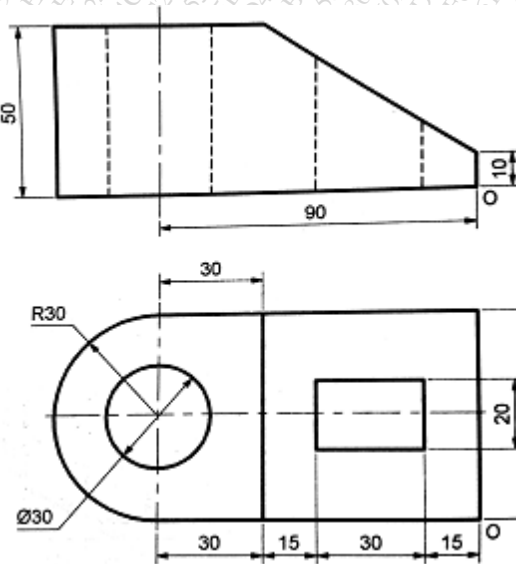b. Draw an isometric view of the following object using natural scale. (6)

Fig.6b

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

N.B.   1.   Question No. 1 is compulsory.
2.   Attempt any **THREE** questions out of remaining **FIVE** questions.
3.   Figures to right indicate full marks.

1) a)   Solve $2\left(x^2\sqrt{y}+1\right)y\,dx+\left(x^2\sqrt{y}+2\right)x\,dy=0$ (4)

b)   Find the particular integral of $(D-3)y=x$ (3)

c)   Evaluate $\displaystyle\int_0^\infty e^{-x^2}\,dx$ (3)

d)   Sketch the region of integration $\displaystyle I=\int_1^4\int_0^{\sqrt{x}}\frac{3}{2}e^{\left(y/\sqrt{x}\right)}\,dy\,dx$ (3)

e)   Prove that $E=1+\Delta=e^{hD}$ (3)

f)   Using Euler's method find the approximate value of y, where $\dfrac{dy}{dx}=\dfrac{y-x}{\sqrt{xy}}$ (4)

and y(1) = 2 when x = 1.5 in five steps taking h=0.1

2 a)   Solve $\dfrac{dy}{dx}+y=y^2(\cos x-\sin x)$ (6)

b)   Show that $\displaystyle\int_0^\infty\frac{\tan^{-1}ax}{x\left(1+x^2\right)}dx=\frac{\pi}{2}\log(1+a)$. Hence evaluate $\displaystyle\int_0^\infty\frac{\tan^{-1}x}{x\left(1+x^2\right)}dx$ (6)

c)   Change to polar and evaluate $\displaystyle I=\int_0^a\int_y^{a+\sqrt{a^2-y^2}}\frac{dx\,dy}{\left(4a^2+x^2+y^2\right)^2}$ (8)

3 a)   Given that $\displaystyle\int_0^\infty\frac{x^{p-1}}{1+x}\,dx=\frac{\pi}{\sin p\pi}$ .P.T $\Gamma(p)\Gamma(1-p)=\dfrac{\pi}{\sin p\pi}$ $(0<p<1)$ (6)

b)   Evaluate $\displaystyle\iiint_V\frac{dx\,dy\,dz}{\left(1+x^2+y^2+z^2\right)^2}$ where V is the volume in the first octant.   (6)

c)   Solve by method of variation of parameters $\dfrac{d^2y}{dx^2}-6\dfrac{dy}{dx}+9y=\dfrac{e^{3x}}{x^2}$ (8)

4 a) Evaluate $I = \int_0^\pi 2 d\theta \int_0^{a(1+\cos\theta)} r \, dr \int_0^h \left[1 - \frac{r}{a(1+\cos\theta)} \right] dz$ **(6)**

b) Solve $(D^3 + 2D^2 + D)y = e^{3x} x^2 + \sin^2 x$ **(6)**

c) Using fourth order Runge-Kutta method, solve numerically **(8)**
$\frac{dy}{dx} = x^2 + y^2$ with the conditions x = 1, y = 1.5 in the interval
(1, 1.2) with h = 0.1 correct to 4 decimals.

5 a) The density at any point of a cardioid $r = a(1+\cos\theta)$ varies as the **(6)**
square of its distance from its axis of symmetry. Find its mass.

b) An equation in the theory of stability of an aeroplane is **(6)**

$\frac{dv}{dt} = g\cos\alpha - kv$ v being velocity and g, k being constants. It is observed

that at time t = 0, the velocity v = 0. Solve the equation.

c) **(8)**
Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) Trapezoidal Rule, (ii) Simpson's $(1/3)^{rd}$

Rule and (iii) Simpson's $(3/8)^{th}$ Rule. Also find the error.

6 a) Solve $(2x+1)^2 \frac{d^2 y}{dx^2} - 2(2x+1)\frac{dy}{dx} - 12y = 6x$ **(6)**

b) For the curve $x = a(2\cos t - \cos 2t)$, $y = a(2\sin t - \sin 2t)$, find **(6)**
the length of the arc of the curve measured from $t = 0$ to any point

c) Find the volume cut off from the paraboloid $x^2 + \frac{1}{4}y^2 + z = 1$ by the **(8)**

plane z = 0

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Time: 2Hours   **Marks: 60**

N. B.   1) Question no 1 is compulsory
        2) Attempt any three questions from remaining three questions.
        3) Assume suitable data wherever required
        4) Figures on the right indicates marks

1   Attempt any five   15

   a   In Newton's ring experiment the diameter of 5th dark ring is 0.5cm, calculate the diameter of 20th dark ring.

   b   What is meant by absent spectra? Write the condition of absent spectra.

   c   A fiber cable has an acceptance angle of 30^0 and a core refractive index is 1.4. Calculate the refractive index of cladding.

   d   What is resonance cavity? Explain its importance in Lasers.

   e   What is the wave function of matter wave? Explain its physical significance

   f   How do you measure phase difference between two A.C. signals by CRO?

   g   Define superconductivity and explain the statement, "Diamagnetism is the test of superconductivity".

2 a   For Newton's ring, prove that diameter of nth dark ring is directly proportional to the square root of natural number.   5
      If the diameter of nth and $(n+10)^{th}$ Newton's dark ring are 4mm and 8mm respectively. Determine the wavelength of light used if the radius of curvature is 2 m.   3

   b   Differentiate between Step Index and graded Index optical fiber and derive an expression for numerical aperture of step index optical fiber.   7

3 a   How is laser different than that of ordinary source of light? With neat diagram explain the construction and working of Nd-YAG Laser.   8

   b   Why are the fringes straight in the interference pattern of wedge shaped film? Derive an expression for fringe width.   7

4 a   What is grating element? A monochromatic light of wavelength 5×10^{-5} cm falls normally on a grating of 2cm wide. The first order maxima is produced at 18^0 from the normal. What are the total number of lines on the grating?   5

   b   What is Heisenberg's uncertainty principle? Prove it using single slit electron diffraction.   5

   c   What are critical temperature and critical magnetic field of superconducting material? The transition temperature for Pb is 7.2 k. At 5 k it losses the superconducting property if subjected to magnetic field of 4×10^4A/m. Find the critical magnetic field at 0k.   5

5 a   For plane transmission grating, prove that the condition of diffraction maximum is $d\sin\Theta=n\lambda$, n=0, 1, 2, 3…………   5

   b   Derive one dimensional time independent Schrodinger wave equation.   5

   c   With neat diagram, explain the construction and working of electron microscope.   5

6 a   An electron has momentum of 5×10^{-14} kg-m/s with an accuracy of 0.05%. Find the minimum uncertainty in the location of electron.   5

   b   With neat diagram explain the construction and working of Cathode Ray Tube.   5

   c   What are Nano materials? Explain one of the method of its production in detail.   5

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[Time: 2 Hrs]   **[Marks: 60]**

N.B:
1. Question No.1 is compulsory
2. All questions carry equal marks.
3. Answer any Three questions from remaining Five questions
4. Atomicweights:(Ca=40,Mg=24,Cl=35.5,S=32,H=1,C=12,O=16,Na=23,N=14, Al=27,Fe=56, Ba=137.3)**.**

Q. 1   Answer **any FIVE** from the following   **(15)**

a) Define Corrosion. List the types of corrosion

b) Define Fuel. Give the characteristics of good fuel

c) Give composition, properties and uses of Gun Metal

d) What are green Solvents? Give two industrial applications of green solvents.

e) Give classification of composite material

f) What is metal cladding? How is 'alclad' obtained?

g) 2.55 gm. Of coal was heated in kjeldahl's flask and ammonia gas evolved was absorbed in 50 ml of 0.5 N H_2SO_4.The excess acid required 40 ml of 0.5N KOH for neutralization. Calculate the % of Nitrogen in the coal sample.

Q. 2 a) Explain the following factors affecting the rate of corrosion:-   **(06)**
Relative areas of Anode and Cathode
i) pH of the medium
ii) Over voltage

b) Explain refining of petroleum with suitable diagram.   **(05)**

c) Calculate % Atom Economy for the following reaction with respective Allylchloride.   **(04)**

$CH_3 - CH=CH_2$ + Cl_2 ----------------> $Cl - CH_2 -CH=CH_2$ + HCl
      Propene   Allylchloride

Q. 3 a) A gaseous fuel has the following Composition by volume**:** H_2=10%, CH_4=16%,   **(06)**
C_2H_6=20%, CO=22%, CO_2=16%, N_2=8%, O_2=8%.Calculate the volume of air required for complete combustion of $5m^3$of this gas.

b) Explain conventional and Greener route for synthesis of Adipic acid. Highlights the green   **(05)**
chemistry principle involved.

c) Explain inter-granular corrosion with suitable diagram. **(04)**

Q. 4 a) What are Alloy Steel? Explain special effects of the following metals on properties of alloy **(06)** steels.

i)Ni   ii) Co   iii) Mo   iv) Cr .   v) W

b) What is metallic coating? Distinguish between Galvanizing and Tinning **(05)**

c) Explain Laminar composite with suitable example **(04)**

Q. 5 a) What is meant by knocking in Internal combustion engine? Define Octane and Cetane **(06)** Number. Name any two antiknock agents

b) Write short note on following :- **(05)**

i) Compaction   ii) Sintering

c) Define matrix phase of composite materials. State functions of matrix phase. **(04)**

Q. 6 a) With a suitable diagram explain electrochemical mechanism of rusting of Iron in neutral **(05)** aqueous medium

b) A coal sample was found to contain the following composition by weight: -- **(05)** :C=81%,H=5%,S=1%,O =8%,N =1%,And Ash=4%.Calculate the minimum amount of air required for complete combustion of 2 kg of coal

c) i) Distinguish between Brass and Bronze **(03)**

ii) Give composition and uses of the Duralumin **(02)**

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(Duration: 3 hours)   **Total Marks : 80**

N.B. (1) Question no. **1 is compulsory.**

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

    (3) Assume **suitable data** wherever necessary.

    (4) Figures in **right** indicate **full** marks.

1. (a) Write a Program to find sum of the digits of a given number.   4

  (b) Explain any two library functions in math.h with example.   4

  (c) Explain type-casting with suitable example.   4

  (d) Explain ternary operator with example.   4

  (e) Explain nested Structure with example.   4

2. (a) What is recursion? Write a Program to find factorial of given number using recursion.   10

  (b) Write a Program to find sum of even elements present in an array of n elements.   10

3. (a) Write a program to calculate multiplication of two M x N matrices.   10

  (b) Write a program to generate following patterns.   10

    i> 1   ii>   A B C D

         2 3   A B C

         4 5 6   A B

         7 8 9 10   A

4. (a) Compare the following :   10

   i) Entry controlled loop and Exit controlled loop.

  ii) break and continue statements.

  (b) What do you mean by an algorithm and flowchart? Explain with example.   10

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5. (a) Write a program using function to check whether entered string is palindrome or not.   5

   (b) Compare call by value and call by reference with suitable examples.   5

   (c) Define a structure named hotel to display Name, Address, Room charge and No. of rooms.

   Write a Program that reads information about 'n' hotels and display the hotels with

   room charges less than 5000Rs.   10

6. (a) What is a file? Explain different modes with syntax in which file can be opened.   10

   Explain various functions to read and write to a file.

   (b) Write a Program to display all Armstrong numbers between 100 and 999.   5

   (c) Explain static and External storage classes with example.   5

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Q. P. Code: 50852

Time: 2 Hrs   Total marks: 40

Question No. 1 is compulsory
Attempt any three out of the remaining questions
Numbers to the right indicate marks

Q1 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]

Q2 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]

Q3 a) Name and explain vertical communication.   [3]

 b) What do the following non-verbal cues communicate: [1]

    i)   Closed eyes   ii) Pointing finger

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]

Q4 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]

Q5 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

Q5 d) Make sentence with the following pair of words so as to differentiate between their

meanings: i) except, accept   ii) cereal,serial   [2]

Q6. 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.

    a)   What should, according to the writer, be the aim of education?
    b)   Why is increase of skill a distinctive feature of our world?
    c)   What danger does the writer see in the present emphasis on imparting skills?
    d)   What knowledge does science impart to us?
    e)   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]

    1. Words which have the same meaning,

    2. A person with a positive approach

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