QP code : 10099765

FE Sem II NEP 2020 All branches

(Time: 2 hours) **Max Marks: 60**

Note: 1. Question No. 1 is Compulsory.
2. Attempt any 3 Questions from the remaining questions.
3. Scientific Calculator is allowed to use

Que. 1 Attempt **any Five** questions.

a. Solve $(x - 2e^y)dy + (y + x\,sinx)dx = 0$ 3

b. Using Euler's method find approximate value of y when $\frac{dy}{dx} = x^2 + y^2$; $and\ y(0) = 1\ at\ x = 0.6\ take\ h = 0.2$. 3

c. Evaluate: $\int_0^2 \int_0^z \int_0^{yz} xyz\ dxdydz$. 3

d. Evaluate Gamma function $\int_0^\infty x^2 e^{-x^8}\ dx$. 3

e. Evaluate: $\int_0^1 \int_0^x e^{x+y}\ dydx$. 3

f. Solve $(\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + y) = 0$ 3

Que. 2 a. Solve $\frac{dy}{dx} = x + y\ with\ x_0 = 0, y_0 = 1$ by Euler's modified method for $x = 0.05$ correct to three places of decimals.(take h = 0.05) 4

b. Show that $\int_0^{2a} x^2\sqrt{2ax - x^2}\ dx = \frac{5}{8}a^4\pi$. 5

c. Use method of variation of parameters to solve the differential equation $(D^2 - 2D + 2)y = e^x \tan x$. 6

Que. 3 a. Evaluate $\int_0^\pi \int_0^{a\,sin\theta} r\,drd\theta$. 4

b. Solve the differential equation $(x^2 + y^2 + 1)dx - 2xydy = 0$ 5

c. Solve $\frac{dy}{dx} = \frac{1}{x+y}, x_0 = 0, y_0 = 1$ for the interval (0,1) choosing h=0.5 by Runge–Kutta method of 4th Order (up to 3 decimal places). 6

Que. 4 a. Solve $(D^3 + D)y = x^2$ 4

b. Find the mass of the lamina bounded by the curves $ay^2 = x^3$ and the line $by = x$ if the density at a point varies as the distance of the point from the x-axis. 5

c. Solve $\frac{dy}{dx} = 2y(1 - 2xy)$ 6

Que. 5 a. Prove that $\int_0^\infty \frac{\log(1+ax^2)}{x^2}\ dx = \pi\sqrt{a}, (a > 0)$. 4

b. Find the area of the cardioid $r = a(1 + cos\theta)$ by double integration. 5

c. Evaluate by changing into polar coordinates $\int_0^a \int_y^a \frac{x^2}{\sqrt{x^2+y^2}}\ dxdy$. 6

Que. 6 a. Change the order of integration $\int_0^1 \int_0^{\sqrt{1-y^2}} f(x,y)dxdy$. 4

b. Solve the differential equation $(D^2 - 3D + 2)y = e^{2x}x^2$ 5

c. Evaluate $\int_0^1 \frac{x^2}{1+x^3}dx$ by using Trapezoidal rule and Simpson's $(1/3)^{rd}$ rule.(choose h = 0.25) 6

FE - Sem - II - NEP - 2020 - All branch QP : 10098332

Time: 1.5 Hours **Marks:45**

N.B.:

1. **Questions number 1 is compulsory.**
2. **Attempt any two questions from Q.2 to Q.5.**
3. **Figures to right indicate full marks.**
4. **Draw neat labelled diagrams wherever necessary.**

[$^{1}H_{1}$ $^{6}C_{12}$, $^{9}F_{18.9}$, $^{29}Cu_{63.54}$, $^{30}Zn_{65.39}$, $^{50}Sn_{118.7}$, $^{82}Pb_{207.2}$, $^{28}Ni_{58.69}$, $^{47}Ag_{107.86}$, $^{13}Al_{29.98}$]

Density (ρ): Al=2.70 g/cm^3, Cu=8.92 g/cm^3, Zn=7.14 g/cm^3, Sn=7.26 g/cm^3, Pb=11.34 g/cm^3, Ni=8.9 g/cm^3.

Q.1	**Attempt any five questions from the following:**	15
	a. An Alloy contains Cu 80% and Zn 20%. Find atomic percentage and Density of the Alloy.	3
	b. Define Abrasive. List any two natural & artificial abrasives with an example	3
	c. What are Bio-composites? Give two Applications bio-composites.	3
	d. What is natural rubber? List any four drawbacks of natural rubber	3
	e. The polymer sample with cross sectional area 10 m^2. It withstands a maximum tensile force of 800 N, before breaking. Calculate the tensile strength of the polymers.	3
	f. Define Biopolymers. Give their types.	3
	g. Illustrate the term Nanomaterial. Give two uses of Nanomaterial's	3
Q.2	a. Illustrate the term optical fibre. Discuss function of core, clad, coating. Give two advantages of optical fibre	6
	b. What are carbon nanotubes? Write properties & uses of SWCNTs	5
	c. Write short note on intelligent (smart) polymers	4
Q.3	a. Give preparation properties and uses of PMMA.	6
	b. Explain laminar composite with neat labelled diagram and give at least two applications.	5
	c. Give properties composition and uses of Borosilicate glass.	4
Q.4	a. What are Alloy steels? Explain the effect of alloying elements such as Ni, Cr, Mo, W, and Co on alloys.	6
	b. What are Graphene? Discuss structure and properties of Graphene.	5
	c. A Polymer has molecular mass of 120000 g/mole. If the molecular formula of its monomer units is C_2F_4. Determine the polymerization degree.	4
Q.5	a. Discuss fibre reinforced composites with neat labelled diagrams. Give at least two applications	6
	b. Tinman's metal weighs 2100 g. Calculate weight of each constituent and give its two uses.	5
	c. Define Conducting polymers. Discuss working of P-doping and N-doping conducting polymers.	4

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FE sem-II NEP2020 all branch
Q.P. code: 10096052

Duration: 2 Hours **[Max Marks: 60]**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1		**Attempt any THREE**	[15]
	a	Explain ADT. List the linear and non-linear data structures with examples.	[5]
	b	Explain the expression tree with an example.	[5]
	c	List the applications of the stack.	[5]
	d	Differentiate between array and Linked List.	[5]
2	a	Write an algorithm to convert infix expression to postfix expression.	[8]
	b	Write an algorithm to implement operations on queue. (Enqueue(), Dequeue(), Delete())	[7]
3	a	What is a Linked List? Write an algorithm to: (i) Insert a node at the end of the list (ii) Deleting a particular element (iii) Display the linked list	[8]
	b	List and explain the operations on data structures.	[7]
4	a	Write the preorder, inorder and postorder tree traversal sequences for a given tree:	[8]
	b	Design a Huffman tree for the word "MALAYALAM". Also write the Huffman code to represent each symbol.	[7]
5	a	What is a Binary Search Tree? Design a Binary Search Tree for the following elements: 50, 40, 60, 70, 80, 90, 20, 30	[8]
	b	Write an algorithm to implement stack using Linked List.	[7]
6	a	Explain Double Ended queue with an example.	[8]
	b	Evaluate the following postfix expression: 7 4 -3 * 1 5 + / *	[7]

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FE - Sem-II - NEP 2020 - All branches (CSE) qp:- 10099069

Time: (1and 1/2 Hours) **(Total Marks: 45)**

N.B. 1) **Question No. 1 is compulsory.**
2) **Answer any two questions from Q.2 to Q.5.**
3) **Figures to the right indicates full marks**

1. Attempt any **Five**

(a) State three parameters of JFET. **3**

(b) Explain construction and working principle of Photodiode. 3

(c) Calculate Emitter current of a transistor for which $\beta = 50$ and Base current is $20\mu A$. 3

(d) Explain the importance of surface to volume ratio in Nanomaterials. 3

(e) The resistivity of Cu is 1.72×10^{-8} ohm-m. Calculate the mobility of electrons in Cu. 3
Given that : Number of electrons per unit volume is $10.41 \times 10^{28}/m^3$.

(f) Explain the formation of potential Barrier in a P-N junction with the help of neat diagram. 3

(g) Distinguish between FET and BJT (Minimum three points) 3

2. (a) What is Fermi level? Prove that the fermi level lies exactly in between conduction band and valance band of intrinsic semiconductor. **5**

(b) Draw and explain I-V characteristic of P-N junction diode. 5

(c) Explain working of Solar cell. Write it's applications. 5

3. (a) Define amplification factor (β) in a common Emitter configuration of a transistor. Derive relation between α and β . Find equation for collector current. **5**

(b) Explain MOSFET as switch. 5

(c) State principle of electron beam lithography and explain it's working. 5

4. (a) What is meant by LED? What materials are used to construct LED? Explain working of LED with I-V characteristics. **5**

(b) Explain the working of NPN transistor with neat circuit diagram. 5

(c) A sample of n-type silicon has a donor density of $10^{20}/m^3$. It is used in Hall effect experiment. If the sample of thickness 4.5 mm is kept in a magnetic field of 0.55 T with current density of $500A/m^2$. Find (i) Hall voltage developed in it,(ii) Hall coefficient, (iii) Hall angle if mobility of electron is 0.17 $m^2/V\text{-}s$ 5

5. (a) Explain the approaches used in synthesis of nanomaterials. **5**

(b) Draw and explain I-V characteristic of Zener diode. What is meant by avalanche breakdown. 5

(c) Explain drain characteristic of JFET. When a reverse gate voltage of 15V is applied to JFET, gate current is 10^{-3} μA. Find the resistance between gate and source. 5

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FE - Sem - II - NEP 2020 - All Branches

qp: 100 99 181

Duration: 1Hr 30 Minutes **[M. Marks: 45]**

N.B.: (1) Question No 1 is Compulsory.

(2) Attempt any two questions out of the remaining four.

(3) Assume suitable data, if required and state it clearly.

1. Attempt any FIVE **[15]**

(a) Define: Range, calibration and sensitivity with proper examples.

(b) In an experiment performed by a student the readings are 75, 82, 88, 76, 82, 75, and 78. Find the sample mean and sample standard deviation.

(c) Signify the importance of monochromatic light in interference.

(d) Classify transducers based on their function, with suitable examples.

(e) Ultrasonic transducer works using inverse piezoelectric effect. Justify

(f) State the factors influencing the selection of a thermometer.

(g) Explain the optical, electrical, and mechanical properties of materials at the nanoscale.

2. Attempt the following questions.

(a) Exemplify the various parameters associated with a given measuring instrument. Enlist the various sources of errors in the measurement. **[5]**

(b) What is an optical flat? Describe its application in checking the flatness of a surface using fringe pattern analysis. **[5]**

(c) Explain the construction and working of a strain gauge transducer. How it is different from resistive temperature transducers? **[5]**

3. Attempt the following questions.

(a) Draw the experimental diagram for Hall Effect. Give an expression for Hall voltage and Hall coefficient. A sample carries a current of 10 mA in a magnetic field of 0.4T. If the sample thickness is 5 mm and the charge carrier concentration is $n = 8 \times 10^{22} / m^3$, find the Hall voltage. **[5]**

(b) Illustrate the thermoelectric thermometer with its working principle, temperature range, accuracy, response time and applications. **[5]**

(c) Differentiate Scanning Electron Microscope (SEM) with Atomic Force Microscope (AFM). **[5]**

4. Attempt the following questions.

(a) Using the principle of least squares method find the equation of best fit line for the given data: $(x_1, y_1) = (2, 4), (x_2, y_2) = (4, 16), (x_3, y_3) = (6, 36), (x_4, y_4) = (8, 64)$ **[5]**

(b) Illustrate how an LVDT can be used to measure linear displacement. Support your answer with a labelled diagram and appropriate equations. **[5]**

(c) What is bimetallic thermometer? Elaborate each type with proper diagram. **[5]**

5. Attempt the following questions.

(a) Describe the surface contour test. A scratched surface is tested using an optical flat using a light of wavelength 5893 A°. If the distance between two fringes is 1mm and the distance due to scratch is 0.5 μ m. Determine the depth of the scratch. **[5]**

(b) Differentiate ultrasonic flow meters based on their working principles and applications. **[5]**

(c) Explain the process of gas sensing capacitors and water purification using the principles of nanotechnology. **[5]**

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Duration 3hrs. **Marks 60**

NB 1) Question **No. 1** is compulsory
2) Attempt **any three** questions out of the remaining **five** questions.
3) Figures to the right indicate full marks.
4) Assume suitable data wherever required, but justify the same.

Q1. **Attempt any ONE** **(15)**

A. Figure 1 shows an isometric view of a block. Draw the following: **15**
a) Sectional front view (F.V.) looking along arrow Y (Section B-B)
b) Right-hand side view(R.H.S.V)
c) Top View (T.V)

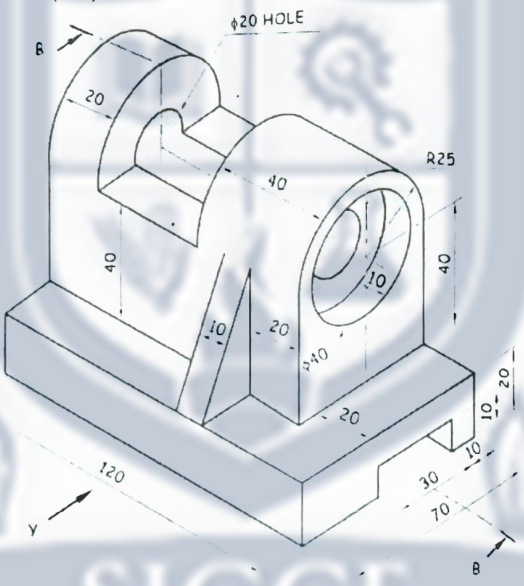

Figure 1

OR

B. Figure 2 shows an isometric view of a block. Draw the following. **15**
a) Sectional front view (F.V.) looking along Section A-A
b) Left-hand side view(L.H.S.V)
c) Top View (T.V)

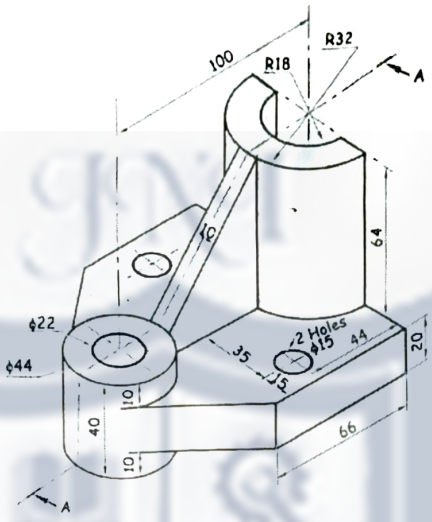

Figure 2

Q2 **A.** One end of an elastic string, 125 mm long is attached to the circumference of a circular disc of 50 mm diameter. The free end of the string is wound around the disc, keeping the string always tight. Draw the locus of the free end and name the curve. **7**

B. For the object shown in Figure 3, draw F.V., T.V. and R.H.S.V. **8**

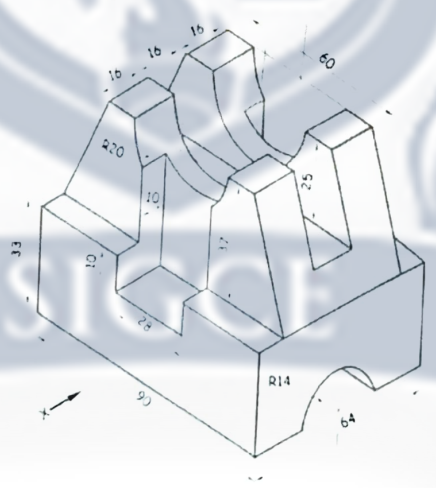

Figure 3

Q3 **A.** A hexagonal pyramid, side base of 30 mm and an axis 80 mm long, has its base edge in the H.P. and parallel to V.P. Draw its projections if its apex is 50 mm above H.P. **15**

Q4 **A.** A hexagonal pentagonal prism, side of base 32 mm and an axis 70 mm long, has its rectangular face on H.P. Its axis is parallel to H.P. and perpendicular to V.P. A cutting plane perpendicular to H.P. but 45 ° to the V.P. cuts its axis at a point 20 mm from the centre of the base. Draw its sectional front view, top view, Sectional side view and true shape of the section. **15**

Q5 **A.** Figure 4 shows two views of an object. Draw its isometric views with natural scale and O as the origin. **9**

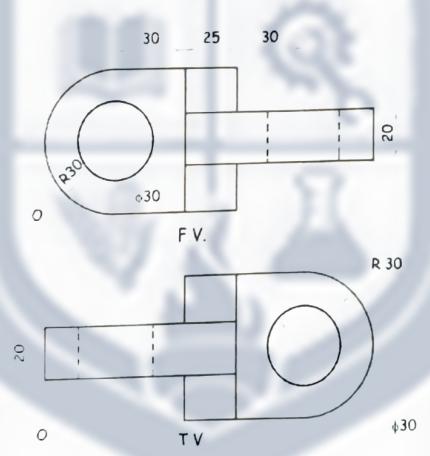

Figure 4 Two view of an object

B. A pentagonal plane of 25 mm side has one of its side in the H.P. Draw its projections, if its surface is inclined at 45° to the H.P. **6**

Q6 **A.** The distance between the end projectors of a straight- line AB is 35 mm. The end A is 10 mm above the H.P. and 20 mm in front of V.P. While end B is 45 mm above H.P. and 70 mm in front of V.P. Draw the projections of the line and determine its inclination with the H.P. and the V.P. Also, find the true length of the line **9**

B. Figure 5 shows two views of an object. Draw its isometric views with natural scale and O as the origin. **6**

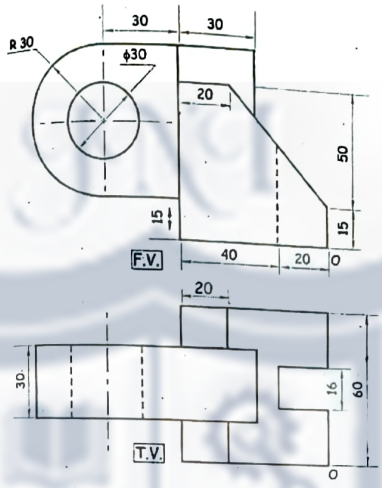

Figure 5 Two views of an object

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FE sem-II NEP-2020 All branch QP-10094138

Duration 2hrs **Total Marks 60**

NB: 1) Question No. 1 is Compulsory.
2) Attempt any three Questions out of remaining five Questions.
3) Assume suitable data if necessary and justify the same.
4) **Figure** to the **right** indicates **marks**

Q1. Answer **any 5** from the following questions

A)	Explain the importance of battery management system.		3
B)	List the advantages of Thermal power plant		3
C)	List different types of transmission lines in power system.		3
D)	List the importances of measurement in electrical power system.		3
E)	Write the power rating of PC, Tube light, fan.		3
F)	Enlist the types batteries used for storage purpose.		3
Q2 A)	Explain in detail medium transmission lines in power system		7
Q2 B).	Explain Lithium-Ion battery with charging and Discharging characteristic		8
Q3 A)	Compare single circuit and double circuit of 3 phase line		7
Q3 B)	Explain industrial, residential and commercial loads with suitable application		8
Q4 A)	Discuss the Hydroelectric power plant with block diagram		8
Q4 B)	Explain Moving Iron type of instruments with detail diagram		7
Q5 A)	Write the short note on electric heating & welding		8
Q5 B)	Explain the structure of power system with the diagram showing different voltage levels of Transmission, distribution and utilization		7
Q6 A)	Write a short note on Battery Management System.(BMS)		8
Q6 B)	A 3-phase line delivers 3600 kW at a p.f. 0·8 lagging to a load. If the sending end voltage is 33 kV, determine • receiving end voltage • line current • Transmission efficiency. The resistance and reactance of each conductor are 5·31 Ω and 5.54 Ω respectively		7

QP code : 10094621

FE sem II All Branches R-19 CSchem

(Time: 3 hours) Max Marks: 80

Note: (1) Question No. 1 is Compulsory.

(2) Answer any three questions from Q.2 to Q.6.

(3) Figures to the right indicate full marks.

Q1.

a) Solve $(4x + 3y - 4)dx + (3x - 7y - 3)dy = 0.$ 5

b) Solve $(D^2 + 4D + 4)y = e^{2x} + 2x$ 5

c) Use Euler's method to find the approximate value of y correct up to four decimal places for x = 0.1 given $\frac{dy}{dx} = x - y^2$ when y(0) = 1 and by considering h = 0.02. 5

d) Change the order of integration $\int_0^1 \int_{x^2}^{2-x} f(x,y)dydx$ 5

Q2.

a) Solve the following differential equation $(D^2 - 4D + 4)y = \frac{e^{2x}}{x^6}$. 6

b) Solve the following differential equation $\frac{dy}{dx} = 2y(1 - 2xy)$. 6

c) Find the approximate value of $\int_0^6 e^x\, dx$ using (i) Trapezoidal rule (ii) Simpson's $(1/3)^{rd}$ rule (iii) Simpson's $(3/8)^{th}$ rule. 8

Q3.

a) Prove that $\int_0^\infty \frac{e^{-x} - e^{-ax}}{x \sec x} dx = \frac{1}{2} log\left(\frac{a^2+1}{2}\right)$. 6

b) Evaluate $\iint xy(x-1)dxdy$ over a region R bounded by $y = 0, x = 1, x = 4, xy = 4.$ 6

c) Evaluate $\int_0^1 \int_0^{1-x} \int_0^{x+y} e^z dzdydx.$ 8

Q4.

a) Find the area bounded by $xy = 2, 4y = x^2, y = 4.$ 6

b) Solve $\frac{dy}{dx} = 2 + \sqrt{xy}$ *where* y(1.2)=1.6403 by Euler's modified formula for x=1.4 up to four decimal places and four approximations. 6

c) Prove that $\int_0^\infty \sqrt{x}e^{-x^2}dx \int_0^\infty \frac{e^{-x^2}}{\sqrt{x}}dx = \frac{\pi}{2\sqrt{2}}$ 8

Q5.

a) Evaluate $\iiint \frac{dxdydz}{(x^2+y^2+z^2)^{3/2}}$ over the volume bounded by the spheres $x^2 + y^2 + z^2 = 25$ *and* $x^2 + y^2 + z^2 = 49$. 6

b) Solve $[y(xcos\ x - sin\ sin\ x) - 2]dx + xsin\ xdy = 0$. 6

c) Solve using method of variation of parameter 8

$$(D^2 + 3D + 2)y = e^{e^x}$$

Q6.

a) Apply Runge-Kutta method of forth order to find an approximate value of y at x = 0.2 if $\frac{dy}{dx} = x + y^2$, given that y(0)=1 in two steps by taking h=0.1. 6

b) Find the length of the cardioid $r = a(1 - cos\ cos\ \theta)$ lying inside the circle $r = a\ cos\ cos\ \theta$. 6

c) Change the coordinate system and evaluate $\int_0^a \int_y^a \frac{x^2}{\sqrt{x^2+y^2}}\ dxdy$ 8

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FE - Sem-II - R-19

gp:- 1009998 95

Time: 2 hour **Max. Marks: 60**

NB: 1) Question No.1 is compulsory.

2) Attempt any three questions from question no. 2 to 6.

Q1 Solve any Five out of the following (5 marks each) **(15 marks)**

A. What is an algorithm? Explain properties of an algorithm.

B. State any two library functions of string.h along with its syntax and e.g.

C. Write a program to print following star pattern

```
*
* *
* * *
* * * *
* * * * *
```

D. Write a C program to find frequency of characters in a string.

E. Give difference between Structure and Union.

F. How to create Array of Structure variables and assign values to its members?

G. Write a program to check whether given year is leap year or not.

Q.2 **(15 marks)**

A. What is Recursion? Write a program to display factorial of number using recursion. **6 M**

B. Write a program to reverse a string **4 M**

C. Explain basic data types in C along with their sizes and ranges **5 M**

Q.3 **(15 marks)**

A. Write a program in C to find the smallest of N elements using an array. **5 M**

B. Explain bitwise operators with example. **4 M**

C. Write a program to print the following pattern. (Note- Not only 4 lines, it should print N lines taken from the user.) **6 M**

```
    A
  B   B
C   C   C
D D   D   D.
```

Q.4 **(15 marks)**

A. Explain nested structure with eg. **5M**

B. Write the output for following code. **5M**

```
#include<stdio.h>
int main()
{
  int val= 1;
  do {
        val++;
        ++val;
  } while(val++>25);
  printf("%d\n", val);
  return 0;
  }
```

C. Write a program to check whether a string is palindrome or not. **5 M**

Q.5 **(15 marks)**

A. Explain the use of following in-built functions of C-language by giving suitable programming examples **6 M**

i) pow()
ii) ceil()
iii)puts()

B. Explain the need of Function Prototype with example. **4 M**

C. Give the difference between entry and exit controlled loop with an example. **5 M**

Q.6 **(15 marks)**

A. Implement a program to find transpose of a matrix. **6 M**

B. Explain the Syntax of switch case?
Discuss what is the need of break statement in switch case? **5 M**

C. Write an algorithm and draw flowchart to find the roots of quadratic equation. **4 M**

FE - Sem-II -R-19 'C' Scheme All branch
QP : 10093212

Time: 2 hours

Max. Marks 60

N.B.

1. **Question No.1 is compulsory**
2. Attempt any **Three** Questions from the remaining Five Questions
3. Figures to the right indicate full marks
4. Atomic weight: C = 12, H = 1, O = 16, N = 14, S= 32, Cl =35.5

Q.1 **Answer any five from the following:** 15

a. Explain the Green chemistry principle- Prevention of waste.

b. Define knocking in fuel engine and antiknocking agents? Give two examples of oxygenates.

c. Give the difference between electrolytic cell and galvanic cell.

d. State the applications of fluorescence in medicine.

e. Write a note on differential aeration corrosion.

f. Define spectroscopy. What is an electromagnetic spectrum?

g. 2.5 g coal sample was kjeldahlised. Blank titration required 25 ml of 0.5 N NaOH solution. After absorption of liberated ammonia in 0.5N of sulphuric acid solution, back titration required 15 ml of 0.5N NaOH solution. Calculate percentage of nitrogen.

Q.2 a) Explain Dry corrosion with the help of reactions and diagram. Also state the various metal oxides formed. 6

b) Explain conventional & green route of manufacturing of indigo. By this reaction which principle of green chemistry is shown? 5

c) Write cell reaction and calculate the standard emf of the following cell. 4
$Cd(s) \mid Cd^{+2}(aq)(1M) \parallel Ni^{2+}(aq)(1M) \mid Ni(s)$. If the standard potential of Cd electrode is - 0.40V and the standard potential of Ni electrode is - 0.25 V.

Q.3 a) Calculate the minimum weight and volume of air required for the complete combustion of 1kg of fuel containing C= 80%, H=6%, O=8%, S=1.5%, H_2O= 1.0%, N=1.5% and ash= rest. (Molecular weight of air = 28.94gm) 6

b) Give construction and working of any one reference electrode with the help of diagram and reactions. 5

c) Calculate % atom economy for the following reaction with respect to epoxide: 4

$C_2H_4 + 0.5\ O_2 \rightarrow CH_2\text{-}O\text{-}CH_2$

Ethene Epoxide

Q.4 a) What is Flame photometry? Explain it with respect to principle, working, diagram and applications. 6

b) Explain the synthesis of biodiesel by trans-esterification method. Mention the advantages of biodiesel. 5

c) Explain any two selection rules in spectroscopy. 4

Q.5 a) Explain the mechanism of corrosion in acidic medium with the help of diagram and reactions. 6

b) 1g of coal sample is placed in an oven maintained at 110°c for 1hr, after heating it was cooled and weighed 0.985 g. Then same coal sample was transferred to vented lid crucible and placed infurnace maintained at 950°C for exactly 7 minutes, on cooling which weighed 0.8 g. Finally, coal was heated in open crucible at 750°C until a constant weight of 0.1 g was obtained. Calculate the result of this proximate analysis. 5

c) Draw a well labelled Jablonski diagram. 4

Q.6 a) Name two methods of cathodic protection from corrosion of metals. Explain any one of it with its principle, suitable diagram and applications. 6

b) A sample of coal was found to contain C = 80%, H = 5%, O = 2%, S = 1, N = 2%, Ash=10%. Calculate HCV and LCV of the coal. 5

c) Differentiate between emission spectra and absorption spectra. 4

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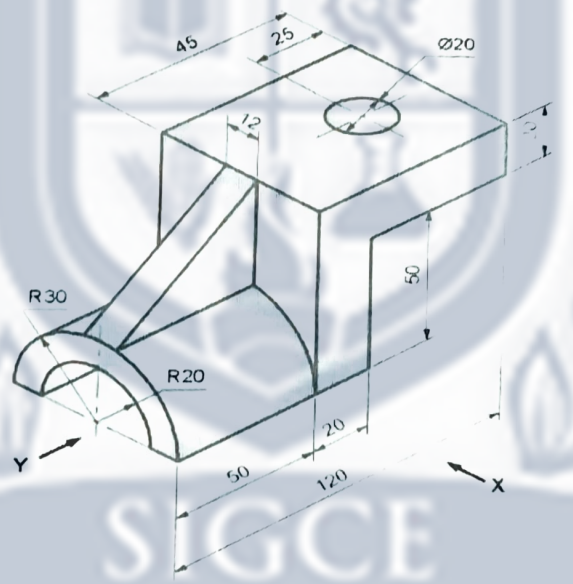
FE - Sem-II - R-19 - C scheme

Time: 3-hours | Max. Marks: 60

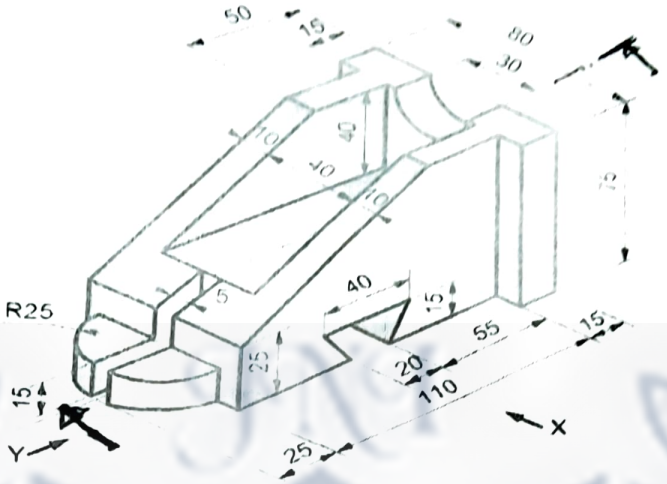
General Instructions:
I) Solve any four questions
II) Figure indicates full marks
III) Use First angle method of projection.

Q1. **a.** An inelastic string 150 mm long has its one end attached to the circumference of circular disc of 40 mm diameter, Draw the curve traced out by the other end of the string when it completely wound round the disc, keeping the disc always tight. **6**

b. Fig shows pictorial view of an object .Draw following views. **9**
a) Front view looking in the direction of X.
b) Side view looking in the direction of Y.



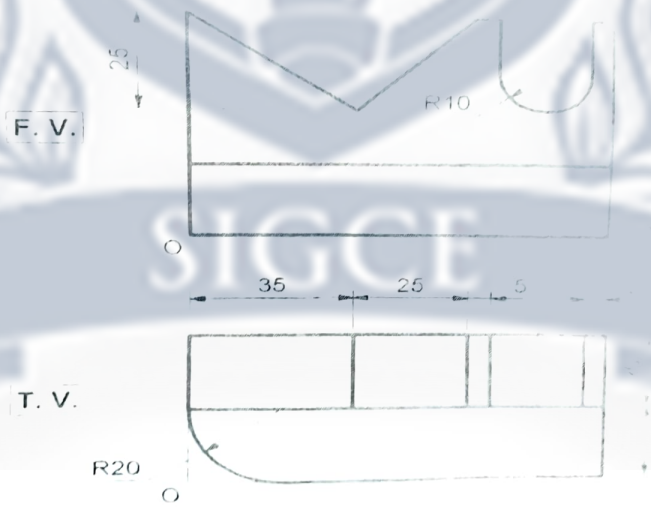
Q2. Fig shows pictorial view of an object. Draw following views.
a) Sectional front view in the direction of X. **05**
b) Top view **04**
c) LHSV **04**
Insert at least 10 Dimension **02**



Q3 A pentagonal pyramid has an edge of base is in HP and inclined at an angle 30° to VP, While the triangular face containing that edge makes an angle of 45° to HP. Draw the projection of the pyramid when the apex nearer to the observer. The length of the side of the base of the pyramid is 35 mm and axis length 75mm. **15**

Q4. **a.** A square prism, side of base 30mm and axis length 60mm is kept on the HP on a corner of the base such that its axis makes an angle of 30° to HP. Draw the projection of the prism. **6**

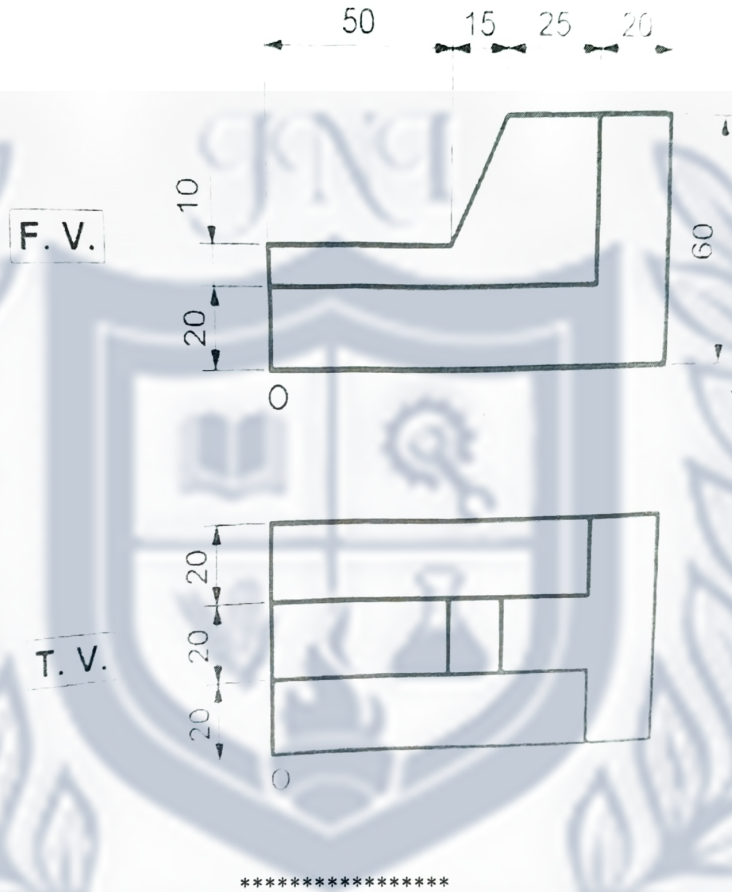
b. Fig Show Front view and Top view of an object. Draw Isometric View. **9**



Q5. A right circular cone having diameter of base 60 mm, axis length 80 mm resting on its base on HP is cut by cutting plane perpendicular to VP and inclined to HP at 60°, bisects the axis. Draw its front view, sectional top view and True shape of section. **15**

Q6. **a.** The distance between the end projectors of line AB is 40 mm. The end point A is 15mm above HP and 20 mm in front of the VP. The line is inclined 30° to the HP. Draw the projections if the true length of line is 80 mm. Find its inclination with the VP, take end point B in the first quadrant. **9**

b. Fig Show Front view and Top view of an object. Draw Isometric View. **6**



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QP code : 10099411

FE sem II R-19 C scheme All Branches.

Time: 2 Hours **Marks: 60**

i. Question number 1 is compulsory
ii. Attempt any three questions from Q2 to Q6
iii. Assume suitable data wherever required
iv. Figures to the right indicate full marks for that question

Q 1 Attempt any five out of Six (3 marks each) **15**

A Identify whether the vector $\bar{E} = xz\,\hat{\imath} + xy\,\hat{\jmath} + yz\,\hat{k}$ is Solenoidal.

B If a star radiates energy at the rate of 5×10^{20} Js^{-1}, Calculate the rate at which its mass is decreasing.

C Optical fiber has a numerical aperture of 0.20 and the refractive index of the cladding is 1.59. Calculate the acceptance angle of the fiber in water which has a refractive index of 1.33.

D Explain the Stimulated emission in Laser.

E Select the wavelength of light for which the second minimum coincides with the third minimum for the wavelength 4000 Å.

F Explain the method of Ball Milling to prepare nanomaterial.

Q.2. Attempt All Questions **15**

A What is Plane transmission grating? Explain resolving power of the diffraction grating. A plane grating resolves two lines in the second order. Calculate the grating element, if $d\lambda = 6Å, \lambda = 5.5 \times 10^{-5}$cm and the width of the ruled surface is 1.5cm. **8**

B With neat and labelled energy level diagram explain the working of He-Ne laser. **7**

Q.3. Attempt All Questions **15**

A What are Lorentz transformations? Obtain transformation equation for Time dilation. **8**

B What are the different types of Sensors? Explain the Humidity sensor in detail. **7**

Q.4. Attempt All Questions (5 marks each) **15**

A Interpret the conditions for maxima and minima in a single slit Fraunhofer diffraction.

B What is divergence of a vector field? Show that divergence of a curl of vector is zero.

C With a neat labelled diagram explaining the construction and working of a Tunneling electron microscope (TEM).

Q.5. Attempt All Questions (5 marks each) **15**

A Obtain Maxwell's equation which describes how the electric field circulates around the time varying magnetic field in integral form and differential form.

B Explain the Ultrasonic sensor in detail.

C What is Holography? With neat diagram explain the reconstruction process of a hologram.

Q.6. Attempt three questions (5 marks each) **15**

A Write applications of nanotechnology in different fields.

B Derive an expression for Numerical Aperture of a step index fiber.

C Differentiate between Step index and Graded Index.

QPcode: 100927747

FE Sem-II All branch R-19 cscheme

Time: 2 Hours **Total Marks: 40**

Instructions:

- **Question No. 1 is compulsory.**
- **Attempt any Three questions from Q.2 to Q.6.**
- **Figures to the right indicate full marks.**
- **Answers to the sub-questions should be grouped together.**

Q1 Answer the following questions: **10**

A. What is Communication? Explain any four methods of nonverbal communication. **05**

B. Write advantages of Grapevine Communication. **02**

C. Write a short note on the necessity and importance of feedback. **03**

Q2. Answer any 2 out of 3 questions: **10**

A. i. Importance of communication. **03**

ii. Correct the errors in the following sentences **02**

a) Did you pay your rent yet?

b) It certainly must have been her.

B. i. Explain any three Physical Barriers to communication. **03**

ii. Use following words in a sentence. **02**

a) appraise and apprise

b) affect and effect

C. i. What are the 7 Cs of business correspondence? Explain the ways in which these can be achieved in business letters. **03**

ii. Name the barriers and sub-type of it. **02**

a) A British lady being shocked by the table manners of an American teenager.

b) An employee who suffers in silence at the workplace because he dares not to offer feedback at his workplace to his superior even when asked to.

Q3. Solve Any Two: **10**

A. i. Write a technical description of a printer under the following headings:

a) Definition b) Diagram c) Description of Components d) Working. **03**

ii. Give examples of the British and the American methods of writing the date. **03**

B. i. Write a short note on paralanguage **03**

ii. Provide one word substitute for the following sentences: **02**

a) That which can be seen through

b) One who offers one's services

C. Goods were assured to be delivered within two weeks of placing the order. But you have not yet received the goods, write a letter to your supplier, pointing out the delay and specifying a date by which you wish to get the goods. **05**

Q4. Do as directed: **10**

A. Fill in the blanks: **03**

i. ..... lets the recipient know at a glance what it is about.
ii. Halo and ..... effect is a kind of psychological barrier,
iii. Differences in position and authority can create a ..... barrier.
iv. Chronemics is an aspect of non-verbal communication related to.....
v.The two methods of verbal communication are ..... and .....

B. Match the following: 02 Marks

(i) Resume	(a) our reference
(ii) Full block form	(b) logo/emblem
(iii) FB/104/ 07	(c) C.V.
(iv) Letterhead	(d) salutation
	(e) No indents

C. Define:(i) Pendrive (ii) Calculator (iii) Voltmeter **03**

D. State the difference between hearing and listening **02**

Q5. Answer any 2 out of 3 questions: **10**

A. i. Write the description of an Induction Plate with the definition, labeled diagram and working. **03**

ii. State whether the following statements are true or false **02**

a) The meaning of the message is not in the words
b) The salutation in a business letter changes according to the inside address.

B. Write short note on: (i) Inside Address (ii) Upward communication **05**

C. i. Distinguish between Caution and warning. **03**

ii. What do the following gestures suggest **02**

a.yawning b. Crossed arms c.Clenched fists d.Nail biting

Q6. Answer any 2 out of 3 questions: **10**

A. Read the following passage and answer the following questions. **05**

Radically changing monsoon patterns, reduction in the winter rice harvest and a quantum increase in respiratory diseases- all part of the environmental doomsday scenario which is reportedly playing out in South Asia. According to a United Nations Environment Programme report, a deadly three-km deep blanket of pollution comprising a fearsome cocktail of ash, acids, aerosols and other particles has enveloped this region. For India, already struggling to cope with a drought, the implications of this are devastating and further crop failure will amount to a life and death question for many Indians. The increase in premature

deaths will have adverse social and economic consequences and a rise in morbidities will place an unbearable burden on our crumbling health system. And there is no one to blame but ourselves. Both official and corporate India has always been allergic to any mention of clean technology. Most mechanical two wheelers roll off the assembly line without proper pollution control systems. Little effort is made for R & D on simple technologies, which could make a vital difference to people's lives and the environment.

However, while there is no denying that South Asia must clean up its act, skeptics might question the timing of the haze report. The Johannesburg meet on Rio+10 is just two weeks away and the stage is set for the usual battle between the developing world and the West, particularly the U.S. President, Mr. Bush has adamantly refused to sign any protocol, which would mean a change in American consumption. U.N. environment report is likely to find a place in the U.S. arsenal as it points an accusing finger at countries like India and China. Yet the U.S. can hardly deny its own dubious role in the matter of erasing trading quotas. Richer countries can simply buy up excess credits from poorer countries and continue to pollute. Rather than try to get the better of developing countries, who undoubtedly have taken up environmental shortcuts in their bid to catch up with the West, the U.S. should take a look at the environment profligacy, which is going on within. From opening up virgin territories for oil exploration to relaxing the standards for drinking water, Mr. Bush's policies are not exactly beneficial- not even to Americans. We realize that we are in this together and that pollution anywhere should be a global concern. Otherwise, there will only be more tunnels at the end of the tunnel.

i. Both official and corporate India is allergic to
   a. failure of monsoon
   b. poverty and inequality
   c. slowdown in industrial pact
   d. mention of monsoon technology
   e. crop failure

ii. Which, according to the passage, is a life and death question to many Indians?
   a. increase in respiratory diseases
   b. use of clean technology
   c. thick blanket of pollution over the region
   d. failure in crops
   e. dwindling agricultural yield

iii. Choose the word which is similar in meaning to the word 'profligacy' as used in the passage.
   a. wastefulness
   b. conservation
   c. upliftment

d. criticalness
e. denouncement

iv. What we must realize, according to the passage?
a. no country should show superiority over other countries
b. U.N. is putting in hard efforts in the direction of pollution control
c. all countries must join hands in fighting pollution
d. nobody should travel through tunnel to avoid health hazards
e. we must strive hard to increase agricultural production

v. Choose the word which is most opposite in meaning to the word 'morbidity' as used in the passage
a. powerfulness
b. softness
c. healthiness
d. acuteness
e. purposefulness

B. Being the Sales Manager of Apha Technologies, Andheri (W), Mumbai, you have received an annoyed letter from one of your wholesale distributors about the manufacturing defect in the batteries of the laptops that they have bought from your company recently. Draft a suitable reply using the full block form. **05**

C. Write a complete set of effective instructions for welding two pieces of metal together. **05**

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