Th1(b) Computer Application

Full Marks: 80   Time- 3 Hrs

Answer any **FIVE** Questions including Q No.1 & 2

Figures in the right hand margin indicates marks

1.   Answer **All** questions   2 x 10

   a.   Write the symbols used for the following expression in flowcharts
        (I/o, Decision Making, Processing, Connector)

   b.   Interpret MICR

   c.   Define MIPS

   d.   Identify which are variables ....
        (rama,   r-ama,   r_ama,   rama2,   3rama,   (r@ama))

   e.   Distinguish between file and folder

   f.   Define algorithm

   g.   Compare between compiler and interpreter

   h.   Interpret WWW

   i.   Define array

   j.   Write four antivirus softwares

2.   Answer **Any Six** Questions   6 x 5

   a.   Compare between time sharing and multiprogramming operating
        system

   b.   Draw a flow chart to get the factorial of a given number

   c.   Write on several type of operators used in C programming language

   d.   Explain different mode of data processing

   e.   Summarise different types of data transmission mode

   f.   Explain how you could able to know that a computer system is virus
        affected

   g.   Compare between 3rd and 4th generation computers

3.   Draw a flow chart and write a program in C to get the addition of all   10
        even numbers from 1 to 99

4.   Write on sequential, direct and ISAM file access method   10

5.   Briefly write on several types of networking devices used to form a   10
        network

6.   Summarise the features of DOS, UNIX and WINDOWS operating   10
        system

7.   Classify memory in details   10

2nd Sem. / COMMON / 2022(S)

Th2   ENGINEERING CHEMISTRY

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1 & 2
Figures in the right hand margin indicates marks

2 x 10

1.   Answer **All** questions

a. Define Flux. Give an example of Acidic Flux.

b. Calculate the pH of 0.001M KOH solution.

c. What are the characteristics for a compound to be Aromatic?

d. What causes permanent hardness in water?

e. Write down any one difference between Double salt & Complex salt. Give an example of each.

f. Find out the Conjugate Base of HPO_4^{2-}.

g. Write down the electronic configuration of Cr & Cu.

h. Define isotope with an example.

i. Calculate the equivalent weight of CH_3COOH & $Al_2(SO_4)_3$.

j. Write down the general formula for Alkene series. What is the first member of alkene family?

2.   Answer **Any Six** Questions

5 x 6

a. Differentiate between Calcination & Roasting.

b. Write down the composition & uses of Bronze & Duralumin.

c. Differentiate between Saturated & Unsaturated Hydrocarbons.

d. Explain the Hot lime Soda method of softening of hard water.

e. Define Corrosion. Explain waterline Corrosion.

f. Write down the Structural formula & IUPAC name of the following:-

i)   2,3- dibromo -1,4-dichloro - but-2- ene

ii)   5 - iodo - 4,4,5-trichloro - hex-2- ene

iii)   1,1,2,2-tetrafluoro ethene

iv) $CH_3CH(OH)C(Br)C(CH_3)CH_3$

v) $CH \equiv C- CH = CH_2$

g. Explain the Froth floatation method with a labelled diagram.

1

3   Make a comparative study of Arrhenius Theory & Bronsted-Lowry   7
Theory of acids & bases.
Write down the limitations of Arrhenius Theory of acids & bases.   3

4   (a)Differentiate between Thermoplastic & Thermosetting polymers   5
with examples.
(b)How is Polyvinyl Chloride prepared? What are its uses?   5

5   (a) State and explain Faraday's first law of electrolysis.   5
(b)How many grams of NaOH is required to prepare 4L of its
solution having pH 10.   5

6   Explain the Bohr's model of atomic structure. What are the   7+3
drawbacks of this model?

7   (a)What are the conditions for a fuel to be a good fuel?   5
(b)What are Bio-fertilizers ? Write Uses of various Bio-fertilizers.   5

2nd. SEM. /COMMON/ 2022(S)

TH-3 -ENGINEERING MATHEMATICS -II

Time- 3 Hrs

Full Marks: 80

Answer any five Questions including Q No.1& 2

Figures in the right hand margin indicates marks

2 x 10

1.   Answer **All** questions

1. a. Define Modulus Function and represent it graphically.

b. Evaluate $\lim_{x \to 0} \frac{x}{\sqrt{1+x} - \sqrt{1-x}}$

c. Differentiate $\sec^{-1}\left(\frac{\sqrt{a^2+x^2}}{a}\right)$ with respect to x.

d. Define unit vector and find the unit vector of the given vector $2\hat{\imath} + 3\hat{\jmath} + 6\hat{k}$.

e. *Evaluate the integral* $\int \left(e^{5\ln x} - e^{4\ln x}\right) dx$.

f. Define Homogeneous Function and State Euler's Theorem.

g. Find the value of α *so that* $\vec{a} = \hat{\imath} + \hat{\jmath} + \alpha\hat{k}, \vec{b} = 4\hat{\imath} - 3\hat{k}$ are perpendicular to each other.

h. Find the order and degree of the following differential equation

$$\frac{d^2y}{dx^2} = \frac{3y + \frac{dy}{dx}}{\sqrt{\frac{d^2y}{dx^2}}}$$

i. *Find the value of* $\int_{-2}^{2} |x| \, dx$.

j. If $y = t^2$ *and* $x = t^3$ *find* $\frac{dy}{dx}$ *at* $t = 1$.

6 x 5

2.   Answer **Any six** questions:

a. If $f(x) = \begin{cases} ax^2 + b, if \ x < 1 \\ 1, if \ x = 1 \\ 2ax - b, if \ x > 1 \end{cases}$ is continuous at $x = 1$, then find the value of 'a' and 'b'.

b. Find $\frac{dy}{dx}$ *if* $y = (\ln x)^{tanx}$.

c. Determine the area within the curve $y^2 = 4ax$ and the x-axis, the ordinate x=4.

d. Evaluate $\int \frac{\tan x + \tan \alpha}{\tan x - \tan \alpha} dx$.

e. Solve $(1 + x^2)dy + (1 + y^2)dx = 0$.

1

f. Find the scalar and vector projections of the vector $2\hat{\imath} - 3\hat{\jmath} - 6\hat{k}$ on the line joining the points (3,4,-2) and (5,6,-3).

g. Find $\frac{dy}{dx}$ if $x = \frac{2t}{1+t^2}, y = \frac{2t}{1-t^2}$.

3 i If $\sqrt{1-x^6} + \sqrt{1-y^6} = k(x^3 - y^3)$, prove that   7

$$\frac{dy}{dx} = \frac{x^2}{y^2}\sqrt{\frac{1-y^6}{1-x^6}}$$

ii Evaluate $\lim_{x \to 0} \frac{1-\cos^3 x}{x\sin 2x}$.   3

4 i If $u = \tan^{-1}(x^2 + y^2 + z^2)$, show that $xu_x + yu_y + zu_z = \sin 2u$ 7

ii If sum of two unit vectors is a unit vector, show that the magnitude of their difference is $\sqrt{3}$.   3

5 i Evaluate $\int \frac{2x+11}{\sqrt{x^2+10x+29}} dx$.   6

ii If $y = \tan^{-1} x$, prove that $(1 + x^2)y_2 + 2xy_1 = 0$ 4

6 i Solve the following differential equation   7
$$(1 + y^2)dx = (\tan^{-1} y - x)dy$$

ii Find the derivative of $y = e^x$ by first principle.   3

7 i In a triangle AOB, angle $AOB=90^0$. If P, Q are the points of trisection of   6
$\overline{AB}$, prove that $OP^2 + OQ^2 = \frac{5}{9}AB^2$ by vector method.

ii Evaluate $\int e^x \left(\frac{1}{x^2} - \frac{2}{x^3}\right) dx$.   4

2

Th4-A&B Basic Electrical and Electronics

Time- 3 Hrs

Full Marks: 80

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

2 x 10

1.   Answer **All** questions

   a.   What is the importance of pole and pole shoes in DC machine?

   b.   With a 8 ohm resistor and a 6 ohm inductive reactance, what is the total impedance?

   c.   What is the function of penstock in hydroelectric power plant?

   d.   What is fuse? Why it is used?

   e.   Write down 2 uses of PMMC & MI type instrument.

   f.   What is transducer and classify different types of transducer?

   g.   What is the function of filter?

   h.   What is the function of delay line in CRO?

   i.   What is ripple and ripple factor?

   j.   Write down the relationship of output and input current gain in CE, CB configuration.

6 x 5

2.   Answer **Any Six** Questions

   a.
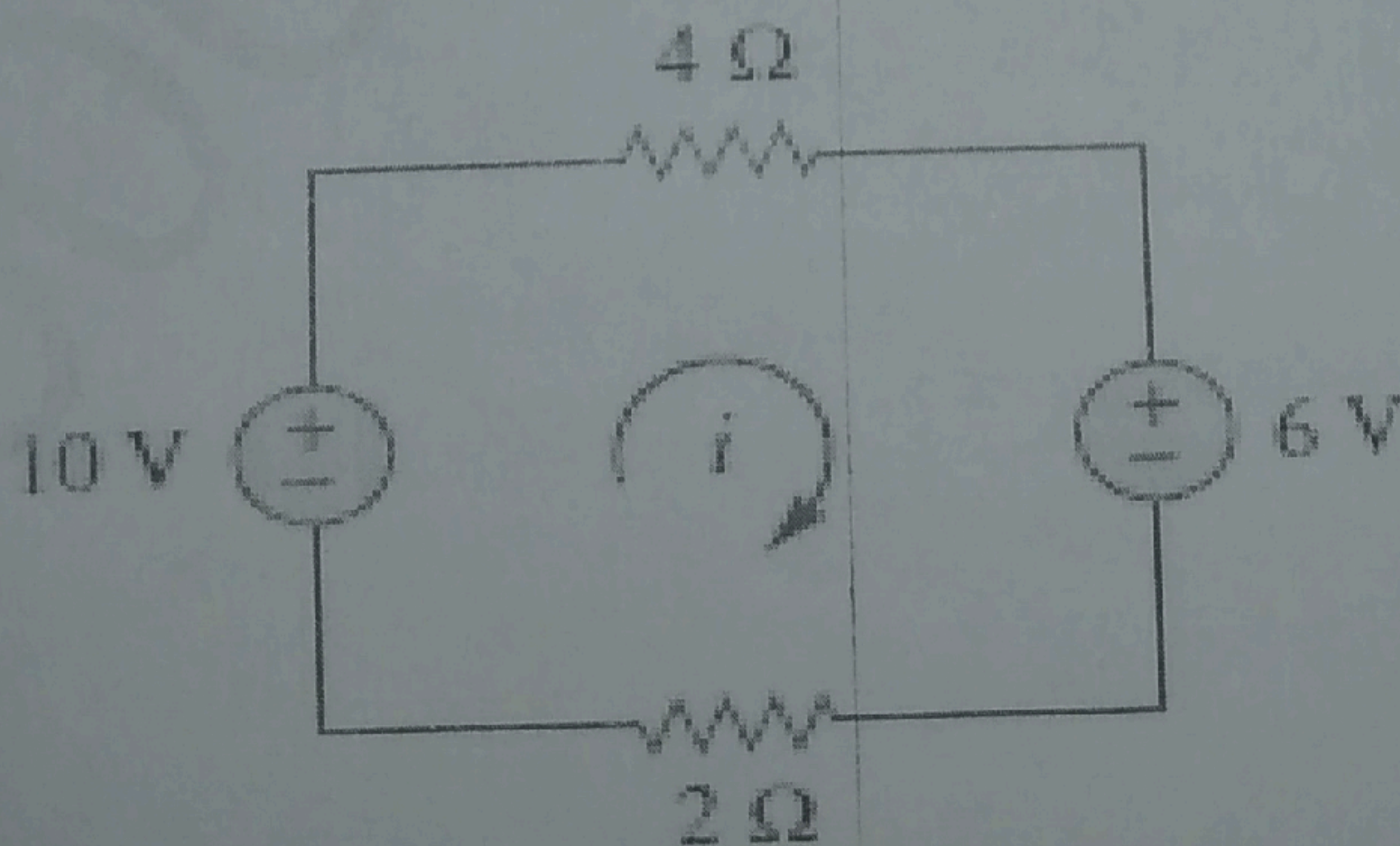
Find out (i)current (ii)voltage drop across 4 ohm and 2 ohm (iii) Power absorbed by resistance 4 ohm and 2 ohm.

b. Write down the construction and principle of filament lamp.

c. Discuss the torques required in measuring instruments in briefly.

d. With a neat block diagram explain the working of unregulated DC power supply system.

e. With a neat circuit diagram explain full wave center tap rectifier.

f. Explain different types of modulation.

g Explain the construction and working principle of a PN junction diode.

3 A coil of resistance 10 ohm and inductance 0.1H is connected in series with a capacitor 150µF across a 200V,50 Hz supply. Calculate (i)Inductive reactance (ii)Capacitive reactance (iii)Impedance (iv) Power factor(v) Current   10

4 A building has the following electrical appliances   10
(i) A 1.5 HP motor running for 6 hrs in a day.
(ii) Four fans each of 80W running for 10 hrs. in a day.
(iii) Four tube lights of 40W running for 15 hrs. per day.
Find the monthly bill for the month of February 2022 if unit cost of bill is Rs.2.50.

5 Draw the block diagram of Thermal Power Plant and explain the function of each elements of it.   10

6 (a) Explain the working principle of single-phase CE amplifier.   10
   (b) Explain working principle of multimeter with block diagram.

7 Define Oscillator and classify it. Also explain working of basic   10
Oscillator with simple block diagram.