

1E3101

Roll No. _____

Total No. of Pages: **3****1E3101****B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY2 – 01 Engineering Mathematics - I****Time: 3 Hours****Maximum Marks: 70***Instructions to Candidates:*

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL _____2. NIL _____**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 Find the limit of the sequence $\langle x_n \rangle$, where $x_n = \frac{5n-3}{7n+8}$.
- Q.2 Write the power series expansion of logarithm function.
- Q.3 Evaluate a_n in the Fourier series of the function $f(x) = x + x^2, -\pi < x < \pi$.
- Q.4 Define Cauchy's (E – δ) definition of continuity.
- Q.5 Write Euler's theorem on homogeneous function.
- Q.6 Evaluate: $\int_0^{\infty} x^6 e^{-2x} dx$ by using beta – gamma function.

Q.7 Evaluate: $\iint xy \, dx \, dy$, where the region of integration is $x + y < 1$ in the positive quadrant.

Q.8 Change the order of integration of the following double integration:

$$\int_0^4 \int_x^{2\sqrt{x}} f(x, y) \, dx \, dy$$

Q.9 If $\vec{f} = x^2y\hat{i} - 2xy^2z\hat{j} + 3x^2z\hat{k}$, find $\text{div } f$ at the point $(3, -1, -2)$.

Q.10 State Stokes theorem.

PART - B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Prove that -

$$B(m, n) = \frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)}$$

Q.2 Test the convergence of the following series -

$$\frac{1}{2} + \frac{1.3}{2.4} + \frac{1.3.5}{2.4.6} + \dots$$

Q.3 Find a Fourier series for the function $f(x) = x^2$ in the interval $-\pi < x < \pi$

and deduce the following: $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$

Q.4 Find the equations of the tangent plane and normal to the surface -

$$x^3 + y^3 + 3xyz = 3 \text{ at the point } (1, 2, -1).$$

Q.5 Evaluate the point where the function -

$$x^3y^2(1 - x - y)$$

Will have maxima. Also find the maximum value.

Q.6 Evaluate the integral -

$$\int_0^1 \int_0^x \frac{x^3 \, dx \, dy}{\sqrt{x^2 + y^2}}$$

by changing into polar coordinates.

Q.7 If \vec{a} and \vec{b} are differentiable vector point functions, then prove that -

$$\text{div}(\vec{a} + \vec{b}) = \vec{b} \cdot \text{curl } \vec{a} - \vec{a} \cdot \text{curl } \vec{b}$$

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Find the volume of spindle shaped solid generated by revolving the Astroid about the x – axis –

$$x^{2/3} + y^{2/3} = a^{2/3}$$

- Q.2 If $u = \log x^3 + y^3 + z^3 - 3xyz$, then prove that –

$$\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$$

- Q.3 Find half range cosine series for the function –

$$f(x) = 2x - 1, 0 < x < 1$$

hence deduce that –

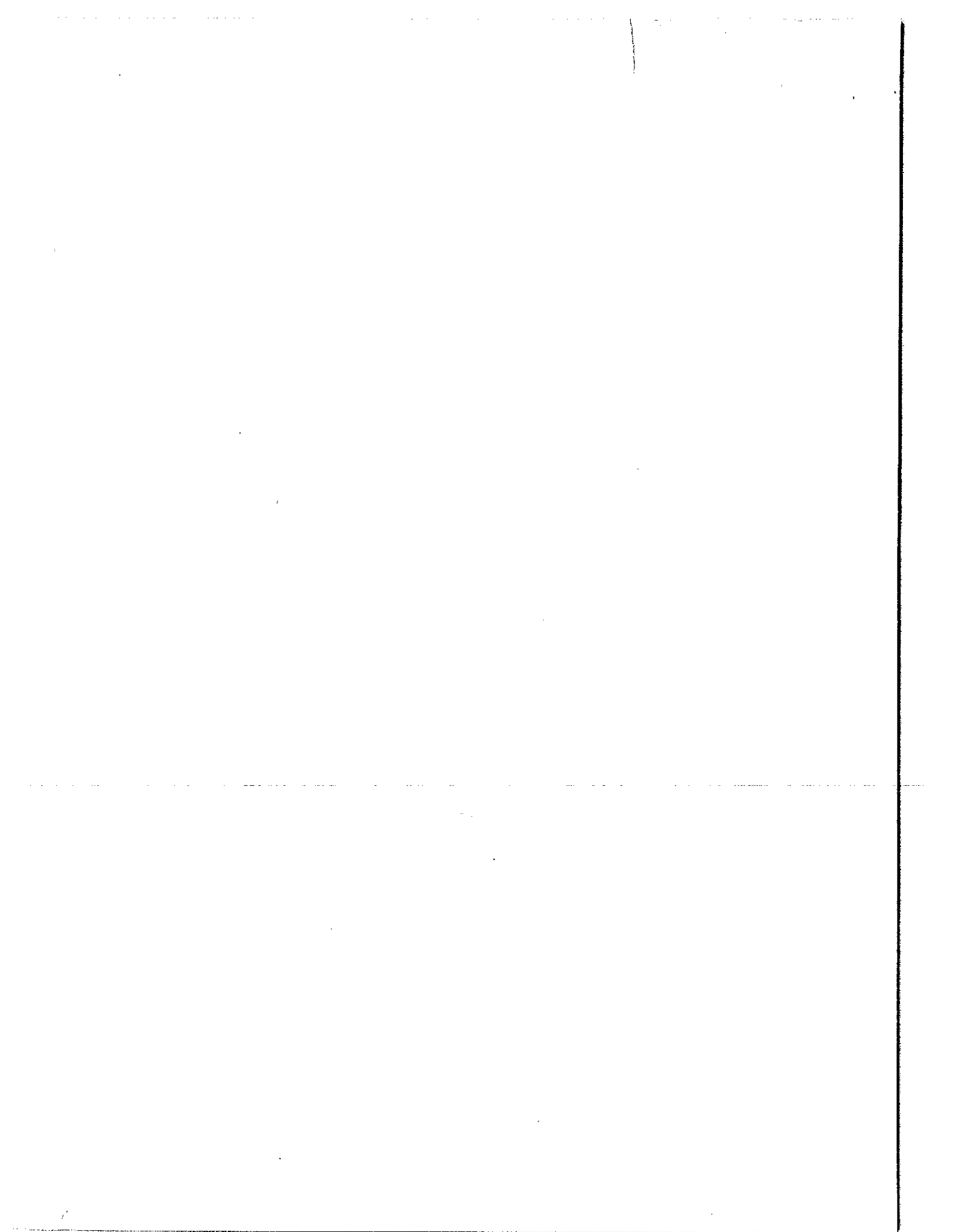
$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$$

- Q.4 Find the volume of the tetrahedron bounded by the co – ordinate planes and the plane –

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$$

- Q.5 State Gauss's divergence theorem. Verify Gauss's divergence theorem for

$\vec{F} = xy\hat{i} + z^2\hat{j} + 2yz\hat{k}$ on the tetrahedron $x = y = z = 0$ and $x + y + z = 1$.



1E3102

Roll No. _____

Total No. of Pages: **3****1E3102****B. Tech. I - Sem. (Main / Back) Exam., - 2023**
1FY2 – 02 Engineering Physics**Time: 3 Hours****Maximum Marks: 70***Instructions to Candidates:*

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL2. NIL**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 Excessively thin film appears dark why?
Q.2 What do you mean by resolving power of an optical instrument?
Q.3 What is normalized and orthogonal wave function?
Q.4 Explain total internal reflection.
Q.5 What are the relation between Einstein's Coefficients? Explain them.
Q.6 What is Hall effect?
Q.7 What is scalar and vector field?

- Q.8 Define curl and divergence of a vector.
- Q.9 What do you mean by spectral purity?
- Q.10 What will be the effect on diameters in Newton's ring experiment if film is of μ refractive index?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Two coherent sources of intensity ratio α interfere. Prove that in the interference pattern $\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}} = \frac{2\sqrt{\alpha}}{1 + \alpha}$
- Q.2 A single slit is illuminated by light composed of two wavelengths λ_1 and λ_2 . One observes that due to diffraction, the first minima obtained for λ_1 coincides with the second diffraction minima of λ_2 . What will be the relation between λ_1 and λ_2 ?
- Q.3 A laser beam has a power of 50 mw. It was an aperture of 5×10^{-3} m and wavelength 7000 Å. A beam is focused with a lens of focal length 0.2 m. Calculate the area spread and intensity of the image.
- Q.4 An optical fibre has a numerical aperture of 0.2 and cladding refractive index of 1.59. Determine the acceptance angle for the fiber in water which has a refractive index of 1.33.
- Q.5 An electric field of 100 V/M is applied to a sample of n-type semiconductor whose Hall coefficient is $-0.0125 \text{ m}^2/\text{Coulomb}$. Determine the current density in the sample assuming mobility of electrons is $0.36 \text{ m}^2/\text{V/S}$.
- Q.6 Derive Laplace's and Poisson's equations starting from the differential form of Gauss's Law.
- Q.7 Find the probability that a particle is in one dimensional box of length l can be found between $0.45 l$ and $0.55 l$ for the ground and first excited states.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Describe and explain the formation of Newton's rings in reflected monochromatic light. How can these be used to determine the wavelength of light? Derive the formula used. [6+4=10]
- Q.2 (a) Derive the Schrodinger time dependent equation and explain the physical meaning of wave function ψ . [8]
(b) What do you mean by degeneracy? [2]
- Q.3 (a) Discuss the formation of energy bands in solids. [5]
(b) Classify the solids on the basis of energy bands and discuss the conductivity in semiconductors. [3+2=5]
- Q.4 Derive the formula for curl and divergence for electrostatic field and static magnetic field. [5+5=10]
- Q.5 (a) What is an optical fibre? Obtain an expression for numerical aperture of step index optical fibre. [5]
(b) Explain visibility of fringes as a measure of coherence. [5]
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1E3103

Roll No. _____

Total No. of Pages: **3****1E3103****B. Tech. I - Sem. (Main / Back) Exam., - 2023****1FY2 – 03 Engineering Chemistry****Time: 3 Hours****Maximum Marks: 70***Instructions to Candidates:*

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL _____2. NIL _____**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 What is carbonate hardness?
Q.2 What is phosphate conditioning?
Q.3 Properties and uses liquid fuel.
Q.4 Define cetane number.
Q.5 Cathodic protection of metal.
Q.6 Give proportion basic constitution of cement.
Q.7 Importance of lubrication in machines.

- Q.8 Properties and uses of hard glass.
Q.9 Discuss elimination reaction with example.
Q.10 Why fire point is higher than flash point?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Analysis report of water is as per the following –

$\text{Mg}(\text{HCO}_3)_2 = 73\text{mg/litre}$; $\text{MgSO}_4 = 60\text{mg/Litre}$

$\text{CaCl}_2 = 111\text{mg/litre}$; $\text{CaCO}_3 = 50\text{mg/Litre}$

$\text{HCO}_3 = 122\text{mg/litre}$; $\text{H}_2\text{CO}_3 = 100\text{mg/Litre}$

Calculate the requirement Lime and Soda for softening 1,00,000 Litres of water.

- Q.2 Calculate the gross and net calorific values of coal sample with following composition -

$\text{C} = 85\%$; $\text{H} = 5\%$; $\text{O} = 2\%$; $\text{S} = 1\%$; $\text{N} = 2\%$; $\text{Ash} = 5\%$

- Q.3 Explain galvanic corrosion with proper example.
Q.4 Discuss the importance of Lime saturation factor and Silica Modulus in cement manufacturing.
Q.5 Discuss the cloud point and pour point of lubricating oil with its importance.
Q.6 Explain break point chlorination method of sterilization.
Q.7 Describe the mechanism of free radical halogenation of alkenes.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 What is water softening? Describe water softening by zeolite method with labelled diagram. [10]
- Q.2 Define coke. Explain Otto-Hoffmann by Product Oven Method for making coke. [10]
- Q.3 (a) Explain the mechanism of electrochemical net corrosion with example. [7]
(b) What is pilling - bedworth rule. [3]
- Q.4 (a) Explain the property of setting and hardening of cement. [7]
(b) Role of gypsum addition in cement. [3]
- Q.5 (a) Explain the manufacturing, properties and uses of Paracetamol. [7]
(b) Importance of drugs in daily life. [3]
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1E3104

Roll No. _____

Total No. of Pages: 3

1E3104

B. Tech. I - Sem. (Main / Back) Exam., - 2023

1FY1 – 04 Communication Skills

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 What is 'decoding'?

Q.2 What is 'communication barrier'?

Q.3 The following sentence is incorrect. Write the correct sentence:

English is speaking everywhere.

Q.4 Complete the following sentence using the correct tense. Hint is given to complete the sentence:

If you had played well.....(win the match)

- Q.5 What is a 'complaint letter'?
- Q.6 What is 'paragraph'?
- Q.7 Why was the author apprehensive at taking his lady friend to Foyot's?
- Q.8 What happened to Pahom at the end?
- Q.9 What is the central theme of the poem 'No Men are foreign'?
- Q.10 What is 'Heaven of freedom'?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 What is the difference between verbal and non-verbal communication?
- Q.2 What are the qualities of good communication?
- Q.3 Insert appropriate modal verbs. Meaning is given in brackets.
- (i) We.....fight for our rights. (compulsion)
- (ii) He.....stop smoking. (advice)
- (iii) They.....come any time. (possibility)
- (iv) She.....oppose her husband. (Lack of courage)
- Q.4 What is 'resume'? How is it written?
- Q.5 Why does the author think that the divine justice has been delivered to him?
- Q.6 Why should we not wage wars against each other?
- Q.7 What is the theme of the poem 'If' by Rudyard Kipling?

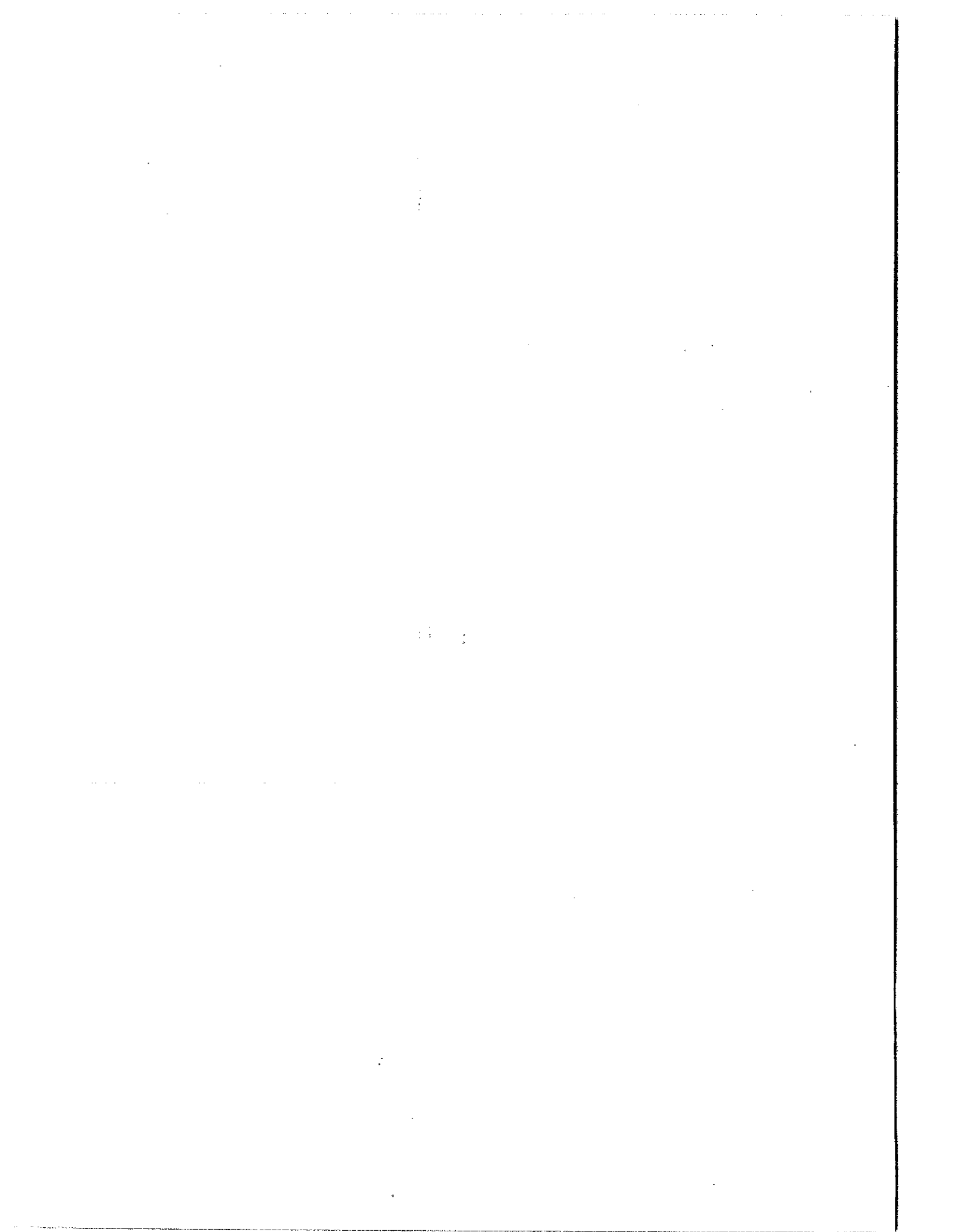
PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 What is 'downward communication'? Discuss its advantages and disadvantages.
- Q.2 (a) Convert these sentences into Indirect speech:
- (i) The doctor said to him, 'you do not take rest'.
 - (ii) She said to her husband, 'I am watching TV.'
 - (iii) The boys said to the girls, 'we will go to library'.
 - (iv) My friend said, 'I don't eat rice'.
 - (v) Anita said to her brother, 'I have finished my work.'
- (b) Choose the correct alternative:
- (i) He will go neither to the water park.....to the zoo. (nor/or)
 - (ii) I had hardly reached the station.....the train left. (than/when)
 - (iii) No sooner did he receive the phone call.....he left for his son's school. (when/than)
 - (iv) He has neither a pencil.....a sharpener. (or/nor)
 - (v) Both she.....her mother will prepare dinner. (and/either/as soon as)
- Q.3 What is a paragraph? What things should be kept in mind while writing a paragraph?
- Q.4 Describe how greed ruins Pahom.
- Q.5 How does the poet suggest that all people on earth are the same?
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1E3106

Roll No. _____

Total No. of Pages: 3

1E3106

B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY3 – 06 Programming for Problem Solving

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL

2. NIL

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

- Q.1 Explain single and multiline comments in C.
Q.2 Describe any four preprocessor directives in C.
Q.3 Describe various symbols used in flow chart.
Q.4 Why keywords cannot be used as identifiers in C?
Q.5 Write the importance of using functions in C.
Q.6 Write pseudo code for checking whether the entered number is even or odd.

- Q.7 Differentiate break and continue statements with example.
- Q.8 Describe various modes of opening a file in C.
- Q.9 How does do-while statement differ from while statement?
- Q.10 Explain relational operators with example.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Find r's complement of following numbers where r is radix(base) of these numbers –
- (i) $(CAFE27)_{16}$
 - (ii) $(246700)_{10}$
 - (iii) $(1101100)_2$
 - (iv) $(320)_8$
- Q.2 Write a C program to swap two numbers without using third variable.
- Q.3 Give differences between primary and secondary memory in tabular form.
- Q.4 Convert the following -
- (i) $(1998)_{10} = (?)_2$
 - (ii) $(11011)_2 = (?)_{10}$
 - (iii) $(921)_{10} = (?)_8$
 - (iv) $(654)_8 = (?)_{10}$
- Q.5 Explain Von Neumann architecture in detail.
- Q.6 Write a C program to find smallest element in an array.
- Q.7 Explain the importance of pointers with respect to dynamic memory allocation.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Write a C program to count number of characters in a text file using file handling.

Q.2 Write a C program to print patterns -

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1  2  3  4  5
6  7  8  9
10 11 12
13 14
15
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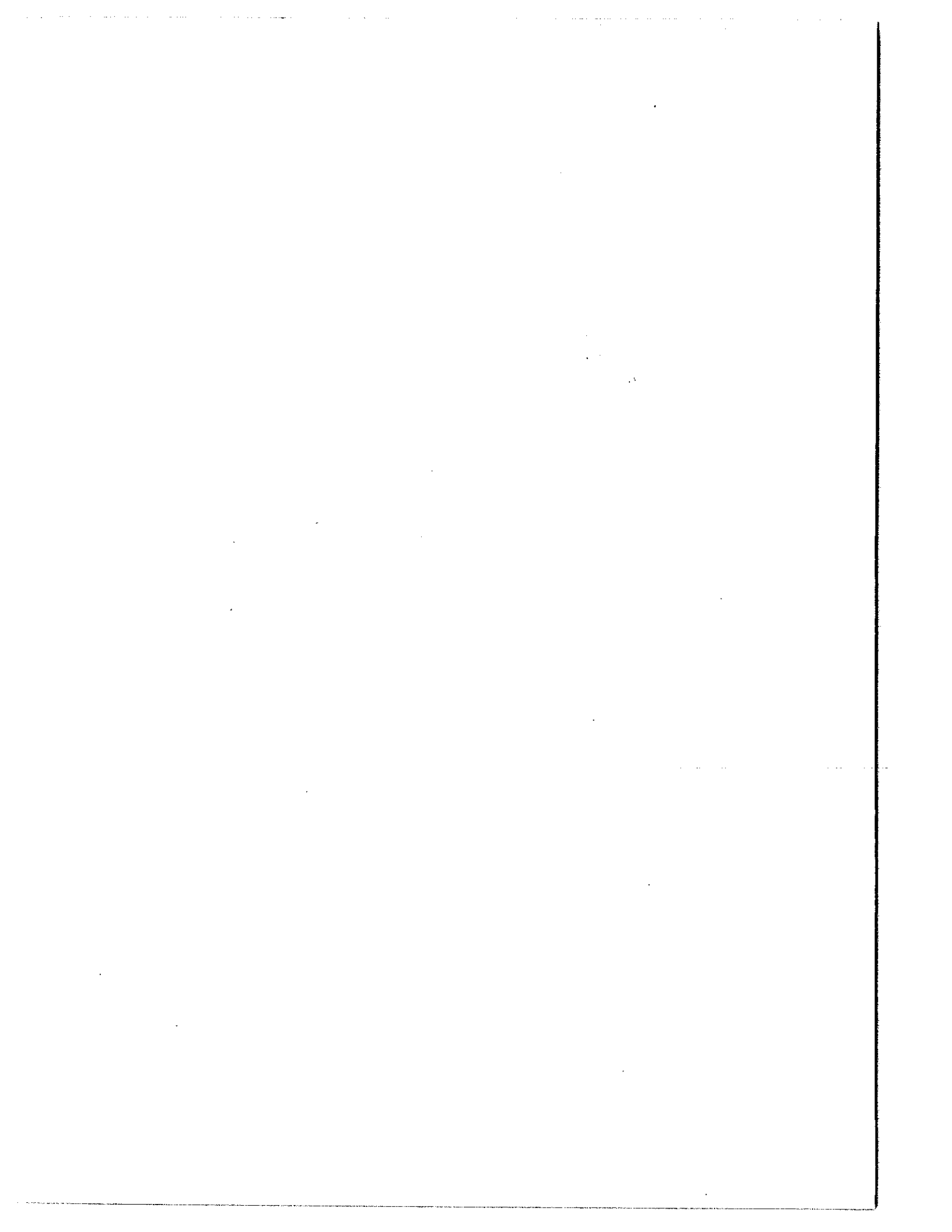
Use for / while loop.

Q.3 How does recursion work? Explain with the help of example. Write advantages and disadvantages of using recursion.

Q.4 Explain call by value and call by reference with help of example of each.

Q.5 Write a C program which store information of 10 students in a structure using loop. For each student, structure maintain roll no., name of student, admission year, category.

After storing the information, also display the information for all students.



1E3108

Roll No. _____

Total No. of Pages: **3****1E3108****B. Tech. I - Sem. (Main / Back) Exam., - 2023****1FY3 – 08 Basic Electrical Engineering****Time: 3 Hours****Maximum Marks: 70***Instructions to Candidates:*

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL 2. NIL

PART – A**[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 Explain the phasor representation of power.
Q.2 State Kirchoff's voltage law.
Q.3 What is fuse?
Q.4 State the torque-slip characteristics of induction motor.
Q.5 Discuss the transformer EMF equation.
Q.6 What are the transformer losses?

- Q.7 What is BJT?
- Q.8 Explain working principle of induction motor.
- Q.9 Explain MCB.
- Q.10 What is resonance?

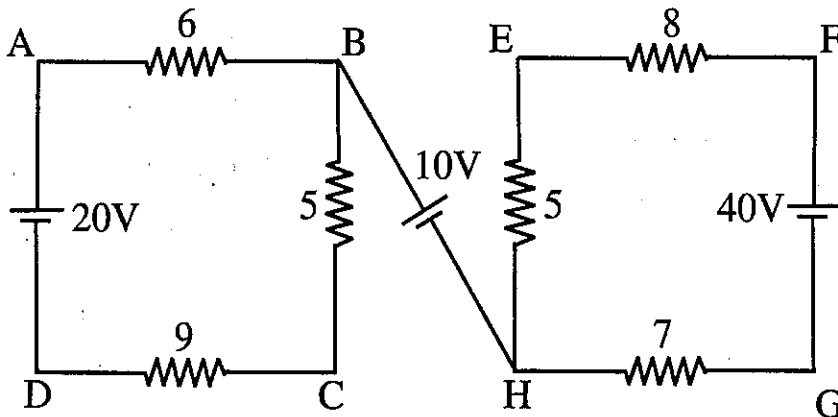
PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 State maximum power transfer theorem.
- Q.2 For the circuit shown in Fig. find V_{CE} and V_{AG}



- Q.3 An alternating voltage is given by $V=230\sin 314t$. Calculate frequency and maximum average & RMS value of voltage.
- Q.4 Describe the construction details of single phase transformer.
- Q.5 With a neat circuit diagram, explain the construction and principle of operation of DC machine.
- Q.6 Explain IGBT in detail with neat diagrams.
- Q.7 With suitable example, explain the calculations for energy consumption.

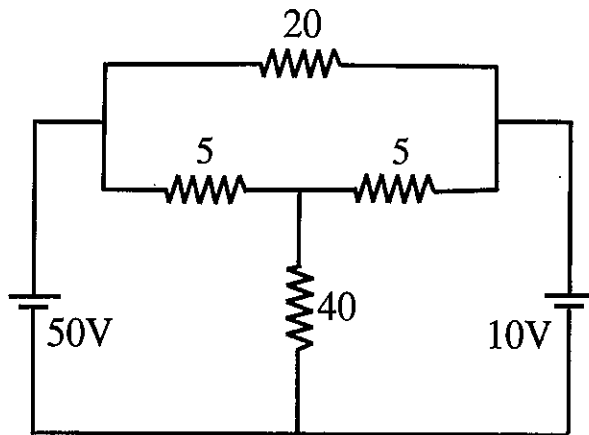
PART - C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Use Superposition Theorem to find the current in 40 ohm, in the network shown:



- Q.2 Explain about Star and Delta connected three phase balanced circuits.
- Q.3 Explain the tests on a single phase transformer and develop an equivalent from the above tests.
- Q.4 Explain the different characteristics of DC Motor.
- Q.5 Explain different types of Earthing with suitable diagram.
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1E3109

Roll No. _____

Total No. of Pages: **3****1E3109****B. Tech. I - Sem. (Main / Back) Exam., - 2023
1FY3 – 09 Basic Civil Engineering****Time: 3 Hours****Maximum Marks: 70***Instructions to Candidates:*

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL2. NIL**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 What is Surveying?
Q.2 Define Building Byelaws.
Q.3 Discuss the difference between Plinth area and Carpet area.
Q.4 Enlist any four traffic signs.
Q.5 Differentiate Foresight, Back sight and Intermediate sight.
Q.6 What do you understand by 'Infrastructure' Development?
Q.7 What is the Flow of energy in the ecosystem?

- Q.8 Write the name of two instrument used in linear measurements.
- Q.9 Define latitude and longitude of a line.
- Q.10 What do you mean by ecosystem?

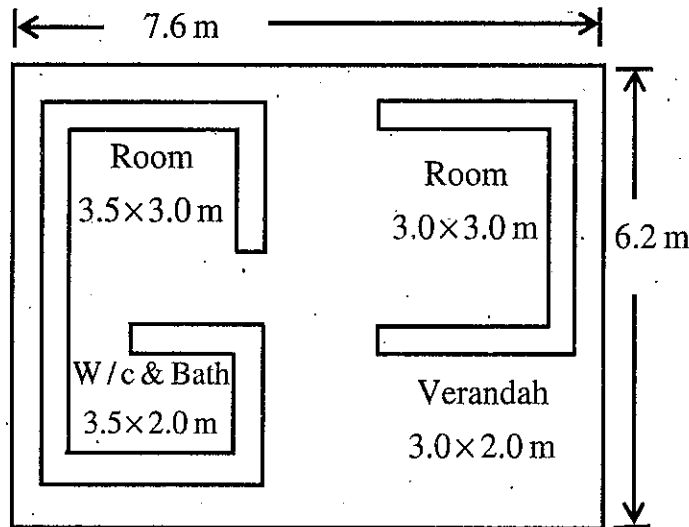
PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 What are the fundamental principals of surveying? Explain briefly.
- Q.2 Explain “how Orientation affects the ventilation of a building”.
- Q.3 Enlist any four important chemical characteristics of raw water. Mention the method of analysis and its acceptance value as per water Quality standards of any two of them.
- Q.4 Calculate plinth area, floor area and carpet area for the plan of a building given below. Wall thickness is 30 cm.



- Q.5 Write short note on “Energy recovery from recycling of solid waste”.
- Q.6 Explain the methods to control noise pollution.
- Q.7 Write short note on “Transportation Engineering”.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Explain the steps involved in laying out of building plan on ground.
- Q.2 Explain with a neat sketch construction of a Prismatic compass.
- Q.3 Discuss the components of a residential building with a neat figure.
- Q.4 Discuss with neat sketch –
- (1) Hydrological cycle
 - (2) Carbon cycle
- Q.5 In traversing in anti-clock wise direction, the following readings were observed.

Line	AB	BC	CD	DE	EA
Fore Bearing	105°15'	20°00'	316°30'	187°15'	122°45'

Draw a neat sketch of the traverse. Determine the interior angles of the traverse and apply check.

