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1E3101

Roll No. _____

Total No. of Pages: 2

1E3101

B. Tech. I - Sem. (Main/Back/Re-back) Exam., Jan.-2026

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 questions 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 Write the relation between Beta and Gamma function.
- Q.2 Find the volume of solid generated by revolving the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ about the x-axis.
- Q.3 Test the series $1 - \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} - \frac{1}{4\sqrt{4}} + \dots$
- Q.4 Define the power series.
- Q.5 Define the periodic function.
- Q.6 State the Parseval's theorem.
- Q.7 Evaluate $\lim_{(x,y) \rightarrow (1,2)} \frac{x^2+7y}{x+y^2}$
- Q.8 Evaluate $\text{curl } \vec{q}$; where -
 $\vec{q} = (y+z)\mathbf{i} + (z+x)\mathbf{j} + (x+y)\mathbf{k}$
- Q.9 Evaluate $\int_0^3 \int_1^2 xy(1+x+y) dx dy$.
- Q.10 State Gauss's divergence theorem.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Evaluate $\int_0^{\frac{\pi}{6}} \cos^4 3\theta \sin^2 6\theta \, d\theta$.
- Q.2 Test the series –
$$\frac{x}{1.2} + \frac{x^2}{2.3} + \frac{x^3}{3.4} + \frac{x^4}{4.5} + \dots$$
- Q.3 Find half range cosine series for the function $f(x) = 2x - 1$.
- Q.4 Find the directional derivative of $(x^2 + y^2 + 4xyz)$ at $(1, -2, 2)$ in the direction of $2i - 2j + k$.
- Q.5 Find the maximum or minimum value of the function $u = xy + \frac{a^3}{x} + \frac{a^3}{y}$.
- Q.6 Evaluate the following integral by changing its order $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} \, dx \, dy$.
- Q.7 Evaluate $\int_c \vec{F} \cdot d\vec{r}$, where $\vec{F} = x^2y^2\mathbf{i} + y\mathbf{j}$ and c is the curve $y^2 = 4x$ in the xy plane from $(0, 0)$ to $(4, 4)$.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Find the surface area of the solid generated by the revolution of the asteroid $x = a\cos^3 t$, $y = a\sin^3 t$ about the x -axis.
- Q.2 Expand $\sin x$ in powers of $\left(x - \frac{\pi}{2}\right)$.
- Q.3 Find the Fourier series to represent $f(x) = x - x^2$ in the interval $-1 < x < 1$
- Q.4 By using the method of Lagrange's multipliers, find the maximum or minimum value of $u = x^2 + y^2 + z^2$, when $ax^2 + by^2 + cz^2 = 1$ and $lx + my + nz = 0$
- Q.5 Verify Green's theorem for the integration -
 $\int_c [(x^2 - xy^3)dx + (y^2 - 2xy)dy]$, where c is the square with vertices $(0, 0)$, $(2, 0)$, $(2, 2)$ and $(0, 2)$.
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1E3102

Roll No. _____

Total No. of Pages: 4

1E3102

B. Tech. I - Sem. (Main/Back/Re-back) Exam., Jan.-2026

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 questions 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 Why Newton's rings are circular in shape?
- Q.2 Draw intensity distribution curve for a Plane Transmission diffraction grating.
- Q.3 Define degeneracy of energy levels for a free particle in a 3D potential box.
- Q.4 Mention boundary conditions for the Wave function.
- Q.5 What is fractional refractive index change in Optical Fibers?
- Q.6 What are the essential requirements of a laser?

- Q.7 Mention physical significance of Fermi Dirac distribution function.
- Q.8 Write two differences between Covalent and Metallic bonds.
- Q.9 Prove that divergence of a field is a scalar.
- Q.10 Write one application of Biot-Savart Law?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 In a Newton's rings experiment, the diameter of the 15th ring was found to be 0.590 cm and that of the 5th ring was 0.336 cm. If the radius of curvature of the Plano convex lens is 200 cm. Calculate the wavelength of light used.
- Q.2 The distance between the first and the sixth minima in the diffraction pattern of a single slit is 0.5 mm. The screen is 0.5 m away from the slit. If the wavelength of light used is 5000 Å, determine the slit width.
- Q.3 Consider a one-dimensional particle which is confined within the region $0 \leq x \leq a$ and whose wave function is $\Psi(x, t) = \sin\left(\frac{\pi x}{a}\right) \exp(-i\omega t)$. Calculate the probability of finding the particle in the interval $\frac{a}{4} \leq x \leq \frac{3a}{4}$.
- Q.4 What is spectral purity? Derive an expression for coherence length and coherence time in term of wavelength and frequency.
- Q.5 Explain, how energy bands are formed in Solids with a suitable example?
- Q.6 The Hall coefficient (RH) of a semiconductor is $3.22 \times 10^{-4} \text{ m}^3 \text{ C}^{-1}$. Its resistivity is $9 \times 10^{-3} \text{ ohm-m}$. Calculate the mobility and carrier concentration of the carriers.
- Q.7 Deduce the Poynting vector and explain the physical significance for various terms involved in the expression.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Draw labelled diagram of Michelson's interferometer and explain its working. How it is used to find the wavelength of light? What is the order of the central fringe?
- Q.2 Derive the Schrödinger time dependent wave equation and also explain the physical significance of wave function.
- Q.3 With the help of neat energy level diagram, explain how population inversion is achieved in He-Ne laser. Explain why increase in diameter of He-Ne tube may reduce lasing frequency?
- Q.4 Derive an expression for the maximum acceptance angle and numerical aperture of an optical fibre. Also, find the fractional refractive index and numerical aperture for an optical fibre with refractive indices of core and cladding as 1.5 and 1.49 respectively.
- Q.5 Deduce the Maxwell's equation for free space and prove that electromagnetic waves are transverse.
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1E3103

Roll No. _____

Total No. of Pages: **2****1E3103****B.Tech. I - sem. (Main/Back/Re-back) Exam Jan. - 2026**
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 questions 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 the importance of sterilization of water by chlorination method?
Q.2 Merits of zeolite water softening process.
Q.3 What is gross and net calorific value of fuel?
Q.4 Properties and uses of gaseous fuel.
Q.5 Importance of lime saturation factor in cement manufacturing.
Q.6 Differentiate flash and fire points.
Q.7 Composition and uses of borosilicate glass.
Q.8 Significance of "Pilling Bedworth Rule".
Q.9 Why halogenation of alkanes is a substitution reaction?
Q.10 What is galvanization?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Analysis report of water is as follows -
Mg(HCO₃)₂ = 146 mg/litre; MgSO₄ = 60 mg/litre
CaCO₃ = 55 mg/litre; Ca(HCO₃)₂ = 81 mg/litre
Calculate temporary, permanent and total hardness in degree Clark.
- Q.2 Calculate Gross Calorific Value (GCV) of a coal sample having following composition -
C = 84%; H = 6%; O = 4%; N = 3%; Ash = 3%
- Q.3 What are the various factors responsible for the corrosion of metal?
- Q.4 Explain the role of gypsum in the setting of cement.
- Q.5 What is Calgon conditioning used for the prevention of scale formation in boiler?
- Q.6 Importance of proximate analysis of coal.
- Q.7 Explain the mechanism of nucleophilic addition reaction in aldehyde.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 (a) Differentiate between lime soda, zeolite and demineralization softening methods. [5]
(b) The exhausted zeolite was regenerated by 450 litres of brine solution (NaCl) having concentration of 95 gm/litre. Calculate the hardness of water as 20,000 litres of hard water was processed in zeolite softener. [5]
- Q.2 What is carbonization of coal? Describe coke formation by Otto-Hoffmann by product oven method with all the reactions and diagram. [2+8=10]
- Q.3 What is corrosion? Explain galvanic corrosion with suitable example. [4+6=10]
- Q.4 What is Portland cement? Describe manufacturing of cement with diagram. [2+8=10]
- Q.5 Describe synthesis, properties and uses of paracetamol drug. [4+3+3=10]



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1E3104

Roll No. _____

Total No. of Pages: 4**1E3104****B. Tech. I - Sem. (Main/Back/Re-back) Exam., Jan. - 2026**
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 questions 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 Define Communication.
- Q.2 State the importance of Feedback in Communication.
- Q.3 What is Kinesics?
- Q.4 Define Modal Verbs.
- Q.5 What are Conditional Sentences?
- Q.6 Define a Resume.
- Q.7 Name any 4 types of business letters.

- Q.8 Who is the author of the short story - 'The Luncheon'?
- Q.9 Name the author of the poem 'If'.
- Q.10 State the theme of the poem - 'No Men Are Foreign'.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Discuss the process of communication with the help of a diagram.
- Q.2 Explain the rules for conversion of Active to Passive voice giving suitable examples.
- Q.3 What is paragraph writing? Discuss the steps to write a paragraph.
- Q.4 Prepare a report on 'A Blood Donation Camp' organized by your college. Provide all the relevant information regarding the organization of the camp, number of donors, units of blood donated, the contribution to society and future mission etc.
- Q.5 Write the summary of the short story - 'The Luncheon'.
- Q.6 Discuss the central idea of the poem - 'Where the Mind is Without Fear'.
- Q.7 Analyze the theme of - Infatuation that happens during adolescence with reference to the short story - 'The Night Train at Deoli'.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Discuss the barriers to communication and the methods to overcome them.
- Q.2 Prepare an application for job assuming that you have two years of relevant experience for the post of Junior Engineer in a multinational company. Devise the necessary details.

Q.3 (A) Fill in the blanks with suitable modal verbs -

- (i) My friend play the guitar. (Ability)
- (ii) They consult a Doctor immediately. (Necessity)
- (iii) I complete my work by tomorrow. (Determination)
- (iv) His uncle lift weights when he was young. (Past Ability)

(B) Put the following statements into indirect speech -

- (i) I said to Peter, "Let us wait for the award".
- (ii) I asked my friend, "Did you hear an explosion a short while ago?"
- (iii) The boy said, "Alas! I have lost all my money".
- (iv) Manish said, "You must leave a note for your mother, Helen".

Q.4 'Greed can ruin a man's life'. Elaborate the statement with reference to the short story - 'How Much Land Does a Man Need?'.

Q.5 Examine the advice given by a father to his son in the poem - 'If'.

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1E3106

Roll No. _____

Total No. of Pages: **4****1E3106****B. Tech. I - Sem. (Main/Back/Re-back) Exam., Jan. - 2026****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 questions 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 Differentiate between compiler and interpreter.
- Q.2 Find out 9's complement of this number: $(744)_{10}$
- Q.3 What is secondary memory? Give examples.
- Q.4 What is the role of cache memory in computer performance?
- Q.5 Define the role of the Control Unit (CU) in the processing operations of a computer system.

- Q.6 What are different types of computer languages?
- Q.7 Compare different types of computer memories based on various criteria like storage capacity, access speed and cost per bit.
- Q.8 Define the properties of C arrays.
- Q.9 What do you understand by the term type casting in C programming?
- Q.10 What are different bitwise operators in C?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Illustrate the purpose and syntax of various decision-making statements in C.
- Q.2 Convert the following -
- (i) $(345)_{10} = (?)_2$
 - (ii) $(23B)_{16} = (?)_{10}$
 - (iii) $(3815)_{10} = (?)_8$
 - (iv) $(1111)_2 = (?)_{10}$
- Q.3 Describe the representation of alphabets using ASCII and Unicode.
- Q.4 Explain in detail the difference between SRAM (Static RAM) and DRAM (Dynamic RAM). Describe how each type stores data, their speed, cost, power consumption and common applications.
- Q.5 Explain one-dimensional and two-dimensional arrays in C with suitable examples. Also, write a C program to find the sum of all elements in a one-dimensional array.
- Q.6 Explain the Von Neumann architecture in detail. Discuss the steps involved in the instruction execution cycle and highlight the limitations of this architecture.

Q.7 Write a C program to print pattern -

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* * * * *
* * * *
* * *
* *
*
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PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Write and explain the logic of a C program that reads a large text file line by line, counts the frequency of each word and stores the results in another output file.
- Q.2 What are different types of C functions? Find the factorial of a number using recursion. What are call by value and call by reference?
- Q.3 Write a C program to create a student structure using name, id and average marks using proper data types, using array of structures store and print five students' data.
- Q.4 What are pointer variables? What different applications of pointers also create a C program to demonstrate array of pointer?
- Q.5 Write a C program to perform matrix multiplication also design algorithm and flowchart with neat diagram and proper flowchart symbols.
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[1E3106]

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1E3107

Roll No. _____

Total No. of Pages: 2**1E3107****B. Tech. I - Sem. (Main/Back/Re-back) Exam., Jan.-2026
1FY3-07 Basic Mechanical 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 questions 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 Describe the open, close and isolated system.
- ✓Q.2 List the main mountings of boiler.
- ✓Q.3 Name the different types of power plants.
- ✓Q.4 Distinguish between the heat engine and refrigerator.
- ✓Q.5 List main components of an IC Engine.
- ✓Q.6 Define one Ton of Refrigeration.
- Q.7 Write the difference between Brazing and Soldering.
- Q.8 Explain four basic functions of electrode.
- Q.9 Differentiate between impulse and reaction turbine.
- Q.10 Write the classification of engineering materials.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1✓ Discuss the classification of boilers. Explain any one type of fire tube boiler.
- Q.2 Explain the working of reciprocating pump with neat sketch.
- Q.3✓ Explain the working of 4-stroke petrol engine.
- Q.4✓ Describe the construction and working of vapour compression refrigeration system.
- Q.5 Derive the expression for the length of belt for open belt drive.
- Q.6 Explain five types of pattern allowances with neat sketch.
- Q.7 What are the common stages and main objectives of heat treatments process? Explain in brief.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Explain the Metal arc welding and oxy acetylene gas welding with neat sketch. Also, state their application.
 - Q.2 Derive the expression for the ratio of driving tensions in flat belt drive system.
 - Q.3 Explain the vapour compression refrigeration system with neat sketch. Also, explain their application.
 - Q.4 Explain the step by step Metal casting process in detail. Also, explain the tools and equipment used in casting process.
 - Q.5 Two pulleys of diameters 500 mm and 200 mm are mounted on two parallel shafts 2 m apart. These shafts are connected by a cross belt. Find the angle of contact of belt and pulley. If larger pulley rotates at 250 rpm and maximum permissible tension in the belt is 1 kN, find the power transmitted by the belt. Assume coefficient of friction between belt and pulley is 0.25.
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1E3108

Roll No. _____

Total No. of Pages: 2

1E3108

B. Tech. I - Sem. (Main/Back/Re-back) Exam., Jan.-2026

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 questions 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 Kirchhoff current law?
- Q.2 What do you understand by resonance in circuit?
- Q.3 Discuss efficiency of transformer.
- Q.4 What is Kirchhoff voltage law?
- Q.5 Discuss the regulation of transformer.
- Q.6 What do you understand by MCB?
- Q.7 Discuss the real power and reactive power.
- Q.8 Write EMF equation of transformer.
- Q.9 Discuss peak and r.m.s values in AC circuits.
- Q.10 Differentiate the voltage and current sources.

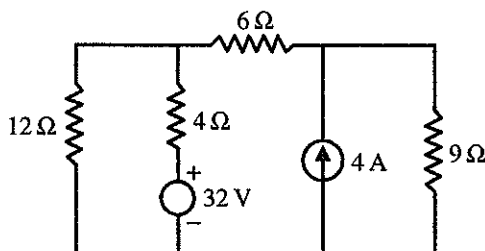
PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Formulate the Maximum power transfer theorems.
Q.2 Compute the power dissipated in the 12 ohm resistor by applying the superposition theorem.



- Q.3 Differentiate the Ideal and Practical transformer in detail.
Q.4 Enlighten the torque-slip characteristic of three phase induction motor with proper diagram/graph.
Q.5 Discuss the framework of the single phase rectifier with R load.
Q.6 Describe the construction and working of synchronous generators.
Q.7 A 100V, 80W lamp is to be operate on 230V, 50Hz supply. Calculate the value of a pure inductance to be connected in series with the lamp so that the lamp may run on its correct voltage. If the power factor of lamp is to be improved to unity, calculate the value of capacitor which is to be connected across the circuit.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Formulate the voltage and current relations in star and delta connections.
Q.2 Deliberate the Single phase Inverter in detail with suitable diagram(s).
Q.3 Describe the equivalent circuit of transformer.
Q.4 Discuss the construction and working of single-phase induction motor.
Q.5 Describe the different types of earthing to protect the different electrical system/circuit(s).
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1E3109

Roll No. _____

Total No. of Pages: 2

1E3109

B. Tech. I - Sem. (Main/Back/Re-back) Exam., Jan.-2026

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 questions 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 do you understand by the term surveying?
Q.2 What is a plinth area?
Q.3 List any two causes of road accidents.
Q.4 Define ecosystem and biodiversity.
Q.5 What is the greenhouse effect?
Q.6 Define solid waste and give one source.
Q.7 What is the function of a foundation in a building?
Q.8 What is total station in surveying?
Q.9 Differentiate between plan and maps.
Q.10 What is the role of a civil engineer in the development of the nation?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 What are the main components of a building? Explain briefly.
- Q.2 Write a short note on the classification and collection of solid waste.
- Q.3 Explain the different types of road traffic signs with suitable examples.
- Q.4 Describe the working principle of a compass used in angular measurements.
- Q.5 Describe the types of buildings based on occupancy.
- Q.6 Explain the impact of infrastructural development on the economy of a country.
- Q.7 Discuss briefly the energy flow in an ecosystem.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 What are the different types of solid waste? Explain its collection, transportation and disposal methods.
 - Q.2 Draw a neat labelled layout plan of a residential building and explain the concept of building by - laws.
 - Q.3 Explain the treatment and disposal of wastewater. Also, discuss the importance of rainwater harvesting.
 - Q.4 Describe the process of levelling. What are the different types of levelling? Mention their applications.
 - Q.5 A line was measured using a tape and found to be 100.20m. The tape was 20mm too long. Calculate the true length of the line. Also, if the slope of the ground is 5° and the measured distance is 100.20m, calculate the horizontal distance.
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