

1E3101

Roll No. _____

Total No. of Pages: 4

1E3101

B. Tech. I - Sem. (Main / Back) Exam., - 2025

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 Evaluate - $\int_0^1 x^2(1-x)^3 dx$

Q.2 Test the convergence of $\int_1^{\infty} \frac{dx}{x^{3/2}}$.

Q.3 What is Convergence and Divergence of a sequence?

Q.4 Find the interval of convergence of Exponential and Logarithmic series.

Q.5 Write Euler's formula of Fourier Series.

Q.6 Find half range sine series for the function $f(x) = x$ in the interval $0 < x < z$.

Q.7 If $u = e^{xyz}$, then find $\frac{\partial^3 u}{\partial x \partial y \partial z}$.

Q.8 Write the equation of the tangent plane to the surface $z = f(x, y)$.

Q.9 Change the order of integration and then evaluate - $\int_0^1 \int_{x^2}^{2-x} xy \, dx \, dy$.

Q.10 Write the statement of Green theorem.

PART - B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Show that $\int_0^\infty \frac{x^2 \, dx}{(1+x^4)^3} = \frac{5\pi\sqrt{2}}{128}$.

Q.2 Test for convergence of the series $\sum \frac{1}{\sqrt{n} + \sqrt{n+1}}$.

Q.3 Find the Fourier series to represent $f(x) = |x|$ for $-\pi < x < \pi$.

Q.4 Find the directional derivative of $\phi = x^2 - 2y^2 + 4z^2$ at $(1, 1, -1)$ in the direction of the vector $2\hat{i} + \hat{j} - \hat{k}$. Also find the direction of maximum directional derivative at $(1, 1, -1)$ and its max value.

Q.5 Find the limit and test for continuity of the function

$$f(x, y) = \begin{cases} \frac{x^3 - y^3}{x + y} & \text{if } x + y \neq 0 \\ 0 & \text{if } x + y = 0 \end{cases} \text{ at the point } (0, 0).$$

Q.6 Evaluate $\iint_R (x^2 + y^2) \, dx \, dy$ where R is the region bounded by $y = x$ and $y^2 = 4x$.

Q.7 Evaluate $\iiint_V f \, dV$ where $f = 2x + y$, V is the closed region bounded by the cylinder $z = 4 - x^2$ and the plane $x = y = z = 0$ and $y = z$.

PART - C**[3×10=30]****(Descriptive/Analytical/Problem Solving/Design Questions)****Attempt any three questions**

- Q.1 Find the Fourier Series to represent $f(x) = x - x^2$ in the interval $-1 < x < 1$.
- Q.2 Test the convergence of the series $\frac{1^2}{2^2} + \frac{1^2 \cdot 3^2}{2^2 \cdot 4^2} + \frac{1^2 \cdot 3^2 \cdot 5^2}{2^2 \cdot 4^2 \cdot 6^2} + \dots$
- Q.3 If $u = f(r)$, $r^2 = x^2 + y^2$ show that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{1}{r} f'(r)$.
- Q.4 Find the volume of greatest rectangular parallelepiped inscribed in the ellipsoid whose equation is $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.
- Q.5 Verify Stokes theorem for $F = (x^2 + y - 4)\hat{i} + 3xy\hat{j} + (2xz + z^2)\hat{k}$ over the surface of the hemisphere $x^2 + y^2 + z^2 = 16$ above the xy plane.
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1E3103

Roll No. _____

Total No. of Pages: 4

1E3103

B. Tech. I - Sem. (Main / Back) Exam., - 2025

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 Provide the various units of expressing Hardness of water and write the equation representing their inter-conversion.

Q.2 Explain about Break-point-chlorination.

- Q.3 Provide the Dulong's formula for the calculation of calorific value of a fuel using GCV & NCV.
- Q.4 What is meant by combustion of fuels? Mention also about the combustible and non-combustible constituents of fuels.
- Q.5 What do you understand by Galvanic series? How it differs from Electro chemical series?
- Q.6 Describe in brief about Tinning.
- Q.7 Explain the role of Gypsum in Cement.
- Q.8 What are Viscosity and Viscosity Index of Lubricant oils?
- Q.9 Provide the Mechanism of Electrophilic aromatic substitution by an example.
- Q.10 Draw the structural formula for Aspirin and Paracetamol & their uses.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Calculate temporary, permanent and total hardness of one liter of water with following impurities -
- $\text{Mg}(\text{HCO}_3) = 0.0246 \text{ gms}$; $\text{Ca}(\text{HCO}_3)_2 = 0.0159 \text{ gms}$, $\text{CaSO}_4 = 0.0168 \text{ gms}$, $\text{NaCl} = 0.0069 \text{ gm}$; and $\text{MgSO}_4 = 0.0057 \text{ gms}$.

- Q.2 Describe the process of Refining of Petroleum with labelled diagram of different fractions.
- Q.3 Write a short note on -
- (a) Anti-knocking agents
 - (b) Cetane number
- Q.4 Explain the method to determine the calorific value of gaseous fuels by Junker's Calorimeter.
- Q.5 Describe the types of Dry or Chemical corrosion.
- Q.6 Provide the composition of Portland cement and its manufacturing process.
- Q.7 Write short notes on -
- (a) Dehydration of Alcohols
 - (b) Free radical Rearrangements

PART - C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Explain following -
- (a) Scale & Sludge formation [4]
 - (b) Boiler corrosion [3]
 - (c) Water softening by Zeolites [3]
- Q.2 Describe the method to determine the calorific value of solid fuels by Bomb Calorimeter and compare the properties of solid fuels with liquid fuels.

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Q.3 Write short notes on following -

[4+3+3=10]

- (a) Pitting corrosion & Concentration corrosion
- (b) Galvanizing
- (c) Sacrificial Anodic Protection

Q.4 Explain in details -

- (a) Types & properties of Glass
- (b) Classification of Lubricants

[5]

[5]

Q.5 Explain following -

[5+5=10]

- (a) Free radical Halogenation
 - (b) Nucleophilic addition in Aldehydes & Ketones
-

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Total No. of Pages: 4

1E3102

B. Tech. I - Sem. (Main / Back) Exam., - 2025

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. NIL

2. NIL

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

- Q.1 Why are Newton's Rings known as fringes of equal thickness?
- Q.2 Why are two lenses used in Fraunhofer diffraction?
- Q.3 What is Schrodinger equation?
- Q.4 How are coherent waves generated?
- Q.5 What is the theory of optical fibre?

- Q.6 What are metastable states?
- Q.7 Why semiconductor diodes are non-ohmic?
- Q.8 Why are bonds formed in solids?
- Q.9 What is the basic principle of electro-magnetic wave theory?
- Q.10 Why do we need gradient, divergence and curl?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 What will be the radius of n^{th} order dark ring in case of -
- (i) When a plano convex lens of radius of curvature R_1 is placed on a plano concave lens of radius of curvature R_2 .
 - (ii) When both the plano convex surfaces are in contact at a point.
- Q.2 A diffraction grating has a resolving power $\frac{\lambda}{\Delta\lambda} = Nn$. Show that the corresponding frequency range $\Delta\nu$ that can be just resolved is given by
- $$\Delta\nu = \frac{c}{Nn\lambda}$$
- Q.3 Derive the Schrodinger time dependent equation and discuss the physical meaning of Ψ and Ψ^2 .
- Q.4 Find the core radius necessary for single mode operation at 800 nm in step index optical fibre with $\mu_{\text{core}} = 1.48$ and $\mu_{\text{cladding}} = 1.47$. Also find the numerical aperture and maximum acceptance angle.
- Q.5 The resistivity of an intrinsic semiconductor is 4.5 ohm-meter at 20°C and 2.0 ohm-meter at 32°C. What is the energy band gap?

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Q.6 Show that the energy density and Poynting vector of electromagnetic field are given by $U_{em} = \frac{1}{2} (\epsilon_0 E^2 + \mu_0 H^2)$ and $S = E \times H$ where symbols have their usual meaning.

Q.7 A LASER beam of wavelength 692.8 nm and aperture 10×10^{-3} m from He-Ne LASER can be focused on an area equal to the square of its wavelength. If LASER source radiates energy at the rate of 20 mw.

Find-(a) angular spread of the beam

(b) Intensity of focused beam

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Discuss Fraunhofer diffraction due to N slits and derive the conditions of Principal maxima and minima. Show that secondary maxima are invisible in this case.

Q.2 What do you mean by degeneracy? Solve Schrodinger equation for a particle confined in 3-dimensional box and get the wave function and energy values.

Q.3 (a) Discuss the spontaneous and stimulated emissions and derive the relation between Einstein's Coefficients and discuss the result.

(b) What do you mean by-

(i) Population inversion

(ii) Pumping

Q.4 What is Maxwell's EM theory? Derive the Maxwell's equations and show that Maxwell's EM wave truly represents light.

Q.5 Write a short note on -

(i) Band theory of solids

(ii) Conductivity in semiconductors and determination of band gap in a semiconductor

1E3104

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Total No. of Pages: 4

1E3104

B. Tech. I - Sem. (Main / Back) Exam., - 2025
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 Give one example of verbal communication and one example of non-verbal communication.
- Q.2 Name two barriers to effective communication.
- Q.3 How do modal verbs differ from regular verbs?
- Q.4 Give an example of a conditional sentence.
- Q.5 What is a curriculum vitae (CV)?

- 13
- Q.6 What is paragraph writing?
- Q.7 Give suitable definition for a short story.
- Q.8 Give an example of a moral lesson from "How Much Land Does a Man Need?"
- Q.9 How are the themes of "No Men are Foreign" and "Where the Mind is Without Fear" similar?
- Q.10 What is the central idea of "If" by Rudyard Kipling?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Describe the qualities that characterize good communication.
- Q.2 Describe the different types of conditional sentences and provide examples of each type.
- Q.3 Prepare a detailed CV for an individual with five years of experience in the IT industry. Include sections on technical skills, projects and professional development.
- Q.4 Write a paragraph about the importance of maintaining a healthy diet. Include reasons and examples to support your points. (120-150 words)
- Q.5 Summarize the plot of "Luncheon" by Somerset Maugham.
- Q.6 Discuss the advice given in "If" by Rudyard Kipling. How can the poem's guidance be applied to personal and professional life?
- Q.7 Discuss the significance of the title "No Men are Foreign." How does the title relate to the poem's message of global unity and peace?

PART – C**[3×10=30]****(Descriptive/Analytical/Problem Solving/Design Questions)****Attempt any three questions**

- Q.1 Discuss the types of communication giving examples of each type.
- Q.2 Write a report on the Annual Science Fair. Include the purpose, event details (date, time, venue, participants), activities, highlights (special guests, award winners, notable projects), and conclusion (overall experience, feedback, recommendations).
- Q.3 Choose the correct option -
- (1) Which sentence is in the passive voice?
 - (A) The manager approved the new policy.
 - (B) The new policy was approved by the manager.
 - (C) The manager is approving the new policy.
 - (D) The manager has approved the new policy.
 - (2) Which of the following sentences is passive?
 - (A) The chef cooked a delicious meal.
 - (B) A delicious meal was cooked by the chef.
 - (C) The chef is cooking a delicious meal.
 - (D) The chef will cook a delicious meal.
 - (3) How would you report the statement -
"She said, 'I am going to the market.'?"
 - (A) She said she is going to the market.
 - (B) She said she was going to the market.
 - (C) She said she will go to the market.
 - (D) She said I am going to the market.
 - (4) How would you report the question -
"He asked, 'Where are you going?'"
 - (A) He asked where am I going.
 - (B) He asked where you are going.
 - (C) He asked where was I going.
 - (D) He asked where I was going.
 - (5) Which is an example of a first conditional sentence?
 - (A) If it rains, I will stay home.
 - (B) If it rained, I would stay home.
 - (C) If it had rained, I would have stayed home.
 - (D) If it rains, I stay home.

- 6) Which sentence uses the second conditional?
- (A) If she studies, she will pass.
 - (B) If she studied, she would pass.
 - (C) If she had studied, she would have passed.
 - (D) If she studies, she passes.
- 7) Which sentence uses a modal verb to express ability?
- (A) She can swim very well.
 - (B) She might swim very well.
 - (C) She must swim very well.
 - (D) She should swim very well.
- 8) Which modal verb indicates a strong obligation?
- (A) She can finish the report.
 - (B) She should finish the report.
 - (C) She must finish the report.
 - (D) She might finish the report.
- 9) Which sentence correctly uses a conjunction?
- (A) She likes to read, but she doesn't like to write.
 - (B) She likes to read, so she doesn't like to write.
 - (C) She likes to read, because she doesn't like to write.
 - (D) She likes to read, or she doesn't like to write.
- 10) Which sentence uses a subordinating conjunction?
- (A) He waited until she arrived.
 - (B) He waited and she arrived.
 - (C) He waited or she arrived.
 - (D) He waited so she arrived.

Q.4 Examine the narrator's emotions in "The Night Train at Deoli."

Q.5 Explain the significance of the phrase "where the mind is without fear."

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Total No. of Pages: 2

1E3105

B. Tech. I - Sem. (Main / Back) Exam., - 2025

1FY1-05 Human Values

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 mean by holistic technology?
- Q.2 What is right understanding and why is it needed?
- Q.3 What do the abbreviations SVDD, SSDD and SSSS signify?
- Q.4 What are the elements of justice?
- Q.5 What are the four orders in nature?
- Q.6 How is animal consciousness different from human consciousness?
- Q.7 How will you differentiate between wealth and prosperity?

- Q.8 What are the sources of our beliefs?
- Q.9 What is the comprehensive human goal?
- Q.10 What does ethical human conduct mean?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 What are the basic guidelines for value education?
- Q.2 Discuss the concept of Sanyam and Swasthya.
- Q.3 What are the broad holistic criterion for evaluation of technologies, production system and management models?
- Q.4 Taking the help of examples, discuss the difference between the needs of the Self and the needs of the Body.
- Q.5 What are the nine feelings in human relationships? Explain.
- Q.6 All nature is submerged in space. Elaborate.
- Q.7 Natural acceptance is there in all of us. Discuss.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Discuss the process of self-exploration.
- Q.2 Critically examine the issues in professional ethics in the current scenario.
- Q.3 Discuss the problems that we face due to preconditions, desires, thoughts and selections.
- Q.4 What is the need for value education in technical institutes?
- Q.5 Are the activities in I continuous or temporary. Discuss.
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1E3107

Roll No. _____

Total No. of Pages: 2**1E3107**

B. Tech. I - Sem. (Main / Back) Exam., - 2025
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 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 open and close system.
- Q.2 What is the function of foot valve in suction pipe?
- Q.3 Difference between belt drive and rope drive.
- Q.4 State the use of piston rings in IC Engines.
- Q.5 Define Ton of refrigeration.
- Q.6 Define mechanical energy and thermal energy.
- Q.7 What are functioning difference between refrigeration and air conditioning system?
- Q.8 Write the comparison between SI and CI engine.
- Q.9 What is mechanical coupling?
- Q.10 What is pump?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Write name of various types of power plants and explain any one in detail.
- Q.2 Explain the working of 4-stroke diesel engine.
- Q.3 Describe the construction and working of vapour absorption refrigeration system.
- Q.4 Describe the metal casting process with suitable diagrams.
- Q.5 Explain construction and working of a typical centrifugal pump with a sketch.
- Q.6 Write the classification of engineering materials.
- Q.7 Derive the expression for the length of belt for close belt drive.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 (a) Define heat treatment. Explain different stages of heat treatment with suitable diagram.
(b) Explain various types of engineering material's properties.
- Q.2 Explain the following processes in details -
(i) Forging
(ii) Rolling
(iii) Drawing
(iv) Extrusion
- Q.3 (a) Belt runs over a pulley of 800 mm diameter at the speed of 180 rpm, the angle of lap is 165° degree and the maximum tension in the belt is 2KN. Determine the power transmitted if the coefficient of friction between the belt and pulley is 0.3.
(b) Write the comparison between SI and CI engine.
(c) How do you classify steam generator? Explain with example.
- Q.4 Write the classification of gear drives. Derive an expression for the tension ratio of belt tensions on the tight and slack side for flat and V-belt passing over a pulley in terms of coefficient of friction and angle of contact of belt over pulley.
- Q.5 Explain the joining processes of soldering, brazing and welding. Clearly bring out the differences between them and give specific applications of each type.

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Total No. of Pages: **4****1E3106**

B. Tech. I - Sem. (Main / Back) Exam., - 2025
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. NIL2. NIL**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

Q.1 What are the difference between CPU & ALU?

Q.2 What is assembler?

Q.3 What is system software?

- Q.4 What is application software?
- Q.5 What are the functions of input unit?
- Q.6 What is volatile & non-volatile memory?
- Q.7 What is microprocessor?
- Q.8 Define number system.
- Q.9 What is primary memory?
- Q.10 What is secondary memory?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Explain block diagram of computer and also explain the functioning of all its components.
- Q.2 Explain the memory architecture of computer in details.
- Q.3 Write a program in 'C' language using pointers that receives a floating-point number and sends back the integer and fraction parts.
- Q.4 Write r's complements of the following numbers, where r is a radix (base) of these numbers with conversion -
- (i) $(1056)_{16}$ to $(?)_8$
 - (ii) $(11672)_8$ to $(?)_{16}$
 - (iii) $(2724)_8$ to $(?)_5$

- Q.5 Write a program of factorial number in 'C' language. Also write the flow chart and algorithm for this.
- Q.6 Explain the concept of file handling. Also write a 'C' language program to copy the data from source file to destination file.
- Q.7 Explain the operator precedence in expression evaluation of 'C' language with suitable example.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Write a program in 'C' language that takes a binary file of long integers and appends a new long integer at the end that is the sum of all integers in the original file.
- Q.2 Explain the storage classes in 'C' language in detail.
- Q.3 Explain the scope and lifetime of variables in 'C' functions. Explain them with suitable examples.
- Q.4 Write a C program to print the following pattern -

```

A
B  B
C  C  C
D  D  D  D
E  E  E  E  E

```

Also write the flow chart for this.

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Q.5 Considering two arrays, A and B, each containing 10 integers. Write a 'C' program that checks if every element of array A is equal to its corresponding element in array B. The program must accept only two pointer values and return a Boolean "true" for equal and "false" for unequal.

1E3109

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Total No. of Pages: 4**1E3109**

B. Tech. I - Sem. (Main / Back) Exam., - 2025
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 are the various types of building plans?
- Q.2 Define bearing capacity of soil.
- Q.3 “Orientation is an essential step while planning a building”. Comment.
- Q.4 Define plinth area, floor area and carpet area.
- Q.5 Explain the fundamental principles of surveying.
- Q.6 What are the advantages of ‘total station’?

- Q.7 What do you mean by 'Ozone layer depletion'?
- Q.8 Describe different kinds of chains used for linear measurements.
- Q.9 Define Building Byelaws.
- Q.10 What are the various modes of transportation?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Draw any five traffic signs and explain the meaning of each in detail.
- Q.2 What are the various components of building? Explain in detail using neat and clean diagram.
- Q.3 Discuss in brief various sources of water.
- Q.4 Explain in brief various methods of disinfection.
- Q.5 What are the sources of errors in compass survey and what precautions will you take to eliminate them?
- Q.6 Describe the 'height of instrument' and 'rise and fall' methods of computing the levels.
- Q.7 Write a note on wastewater treatment system.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

- Q.1 Explain the hydrological cycle and the ill effects of environmental pollution on the hydrological cycle.
- Q.2 Describe with a neat sketch various components of a residential building and their functions.

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Q.3 Describe in detail how you would proceed in the field for -

- (i) Profile levelling
- (ii) Cross - Sectioning

Q.4 Write short notes on the following -

- (a) Screening
- (b) Sedimentation
- (c) Filtration
- (d) Unit operation

Q.5 The following are bearings taken on a closed compass traverse -

Side	Fore bearing	Back bearing
AB	80° 10'	259° 0'
BC	120° 20'	310° 50'
CD	170° 50'	350° 50'
DE	230° 10'	49° 30'
EA	310° 20'	130° 15'

Compute the interior angles and correct them for observational errors.

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Total No. of Pages: 4**1E3108****1E3108**

B. Tech. I - Sem. (Main / Back) Exam., - 2025
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. NIL2. NIL**PART – A****[10×2=20]****(Answer should be given up to 25 words only)****All questions are compulsory**

- Q.1 Define apparent power and power factor.
- Q.2 Write the EMF equation of a transformer and define each term.
- Q.3 If the length a wire of resistance R is uniformly stretched to n times its original value, then what is the value of its new resistance?
- Q.4 Name and state the principle on which transformer works.
- Q.5 State the torque-slip characteristic of an Induction motor.

- Q.6 Write the full form of MCB. Where it is used?
- Q.7 What is the significance of reactive power?
- Q.8 What do you understand by lamination in a transformer?
- Q.9 Distinguish between a rectifier and an inverter.
- Q.10 What are the transformer losses?

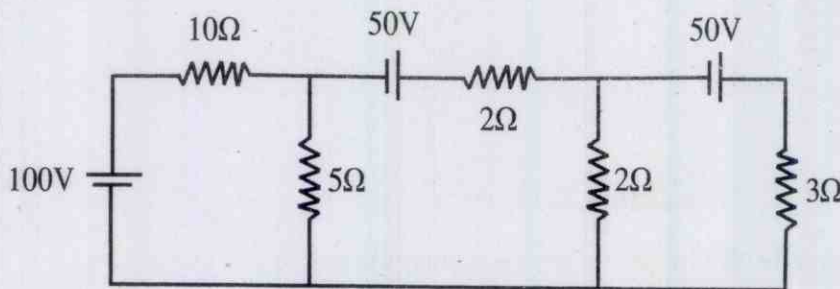
PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

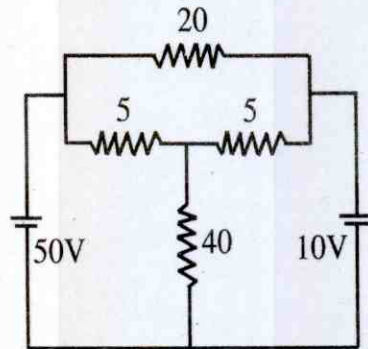
- Q.1 Determine the power factor of a RLC series circuit with $R = 5 \text{ ohms}$, $X_L = 8 \text{ ohms}$, and $X_C = 12 \text{ ohms}$.
- Q.2 Find the current through 5 ohm resistance using Thevenin's theorem in following circuit:



- Q.3 With a neat circuit diagram explain the construction and operating principle of a DC machine.
- Q.4 Derive EMF equation of a single phase transformer. Discuss why transformer is known as constant flux device.
- Q.5 Explain the structure of NPN and PNP transistors in detail.
- Q.6 Write a short note on commutators.
- Q.7 Explain star to delta and delta to star transformation.

PART – C**[3×10=30]****(Descriptive/Analytical/Problem Solving/Design Questions)****Attempt any three questions**

- Q.1 Explain with sketches the constructional features and working of a synchronous generator.
- Q.2 A 100 ohms resistance is connected in series with a choke coil. On applying a 400 V, 50 Hz supply to this combination, the voltage across resistance and choke coil are 200 V and 300 V respectively. Find the power consumed by the choke coil. Also calculate the power of a choke coil and the power factor of circuit.
- Q.3 Use superposition theorem to find the current in 40 ohms resistance in the circuit shown below (assume all resistances in ohms) :



- Q.4 Explain why protective devices are used for overload and short circuit protection. Also explain why do we use an ELCB in electrical circuit installation?
- Q.5 The load of a household consists of 8 lamps of 20W each, 4 fans of 75W each, 1 T.V. of 40W, 1 refrigerator of 150W, 1 AC of 1.5 kW, 1 heater of 1.8 kW, and 1 washing machine of 900W. If the supply is 230 Volts and fixed monthly meter charges are ₹ 150. Then for average loading of 50% throughout a day, what will be the electricity bill? Assume the cost per unit for first 800 units be ₹ 4, next 500 units be ₹ 5 and after that ₹ 6 per unit.

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1E2401

Roll No. _____

Total No. of Pages: 4**1E2401****B. Tech. I - Sem. (Back) Exam., - 2025****BSC****1FY2 – 01 Engineering Mathematics - I****Time: 3 Hours****Maximum Marks: 160
Min. Passing Marks: 56***Instructions to Candidates:**Attempt all ten questions from Part A, five questions out of seven questions from Part B and four 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****[10×3=30]****(Answer should be given up to 25 words only)****All questions are compulsory**

Q.1 Define Beta and Gamma functions.

Q.2 Write the formula of volume of solid of revolution in Cartesian and polar coordinate system.

Q.3 Find the limit of the sequence $\langle x_n \rangle$, where

$$x_n = \frac{2n-7}{3n+4}$$

Q.4 What is D'Alembert's ratio test?

- Q.5 Define Fourier series.
- Q.6 Determine a_0 , when $f(x) = x + x^2$, $-\pi < x < \pi$
- Q.7 What is continuity?
- Q.8 What is sufficient conditions for maxima and minima of functions of two variables?
- Q.9 Evaluate $\int_0^1 \int_0^{1-x} xy \, dx \, dy$
- Q.10 State Gauss's divergence theorem.

PART - B

[5×10=50]

(Analytical/Problem solving questions)

Attempt any five questions

- Q.1 Show that the following series is convergent –

$$\frac{1}{4} + \frac{1}{4^2} + \frac{1}{4^3} + \dots + \frac{1}{4^n} + \dots$$

- Q.2 Find the Fourier series for the function –

$$f(x) = x, -\pi < x < \pi$$

- Q.3 Evaluate - $\int_0^2 x^4 (4 - x^2)^{\frac{1}{2}} \, dx$

- Q.4 Find the surface area of the solid generated by the revolution of the astroid $x = a \cos^3 t$, $y = a \sin^3 t$ about the x – axis.

- Q.5 Evaluate - $\int_0^\infty \int_x^\infty \frac{e^{-y}}{y} \, dx \, dy$
by changing the order of integration.

- Q.6 Evaluate - $\int_{-a}^a \int_{-b}^b \int_{-c}^c (x^2 + y^2 + z^2) \, dx \, dy \, dz$

- Q.7 Find $\text{div } f$ and $\text{curl } f$ at the pt. $(1, -1, 1)$ for
 $f = x \hat{i} + (x + y) \hat{j} + (x + y + z) \hat{k}$

PART – C**[4×20=80]****(Descriptive/Analytical/Problem Solving/Design Questions)****Attempt any four questions**

Q.1 Obtain the half range cosine series of

$$f(x) = \sin x$$

in the interval $0 < x < \pi$

Q.2 Find the equations of the tangent plane and the normal to the surface –

$$z^2 = 4(1 + x^2 + y^2) \text{ at } (2, 2, 6)$$

Q.3 If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ and $r = |\vec{r}|$; prove that : $\text{div } r^n \vec{r} = (n + 3)r^n$ Hence show that $r^n \vec{r}$ will be solenoidal if $n = -3$ Q.4 Using Stoke's theorem, evaluate: $\int_C (xy \, dx + xy^2 \, dy)$, where C is the square in the xy – plane with vertices respectively:

$$(1, 0), (-1, 0), (0, 1) \text{ and } (0, -1)$$

Q.5 Prove that -

$$B(m, n) = \frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)} \quad (m > 0, n > 0)$$

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