

Roll No.

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Total No. of Pages : 03

Total No. of Questions : 05

B.Architecture / B.Tech (ME/EE) (Sem.-1)

COMMUNICATIVE ENGLISH

Subject Code : BCOP-105/BTHU-101

M.Code : 45086

Date of Examination : 20-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. All QUESTIONS are COMPULSORY.
2. All questions carry TWELVE marks.

1. Read the following passage and answer the questions given at the end :

In recent years, the landscape of graduate education has undergone significant changes. With advancements in technology and a globalized academic community, graduate students find themselves navigating new challenges and opportunities.

One major shift is the increased reliance on online resources and virtual collaboration. Graduate programs now offer a plethora of online courses, providing flexibility for students who may be balancing work and academic pursuits. Virtual collaboration tools have become essential, allowing students to engage in research projects with peers from different parts of the world.

Furthermore, the expectations placed on graduate students have evolved. There is a growing emphasis on interdisciplinary research and the ability to communicate findings to diverse audiences. Graduate students are encouraged to attend conferences, present their work and engage in discussions that extend beyond their specific fields of study.

Despite these changes, the core values of graduate education remain steadfast. Critical thinking, research skills and the pursuit of knowledge continue to be at the forefront. The mentorship relationship between faculty and graduate students remains a cornerstone, providing guidance and support as students navigate the complexities of advanced research.

As graduate students adapt to the evolving landscape, they must also grapple with issues such as work-life balance and mental health. The demanding nature of research and academia requires a holistic approach to well-being, prompting universities to provide resources and support services tailored to the unique challenges faced by graduate students.

Answer the following questions :

A. What are some of the challenges and opportunities for graduate students mentioned in the passage?

- a) Increased reliance on online resources and virtual collaboration.
- b) Limited research opportunities.
- c) Decreased emphasis on interdisciplinary research.
- d) Exclusively in-person courses.

B. According to the passage, what are the core values of graduate education?

- a) Work-life balance, mental health, and interdisciplinary research.
- b) Critical thinking, research skills and the pursuit of knowledge.
- c) Virtual collaboration and online courses.
- d) Attending conferences and presenting work.

C. What is the role of mentorship in graduate education, as per the passage? What issues do graduate students need to grapple with, according to the passage?

- a) Work-life balance and mental health.
- b) Exclusively in-person courses.
- c) Limited research opportunities.
- d) Decreased reliance on online resources.

D. How has technology impacted graduate education, as mentioned in the passage?

E. Use the following words in meaningful sentences :

Significant, navigating, interdisciplinary, complexities, pursuit.

Roll No.

Total No. of Pages :02

Total No. of Questions : 09

**B.Tech. (AI&DS/AI&ML/Block Chain/CE/IOT/CSE/EEE/CS/EE/ECE/FT/IT
/ME/CSD/ETE/DS/R&AI/Internet of Things and Cyber Security Including
Block chain Technology) (Sem.-1)**

ENGINEERING MATHEMATICS-I

Subject Code : BTAM101-23

M.Code : 93796

Date of Examination : 03-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Write short notes on :
 - a) Explain absolute convergence of improper integrals of second kind.
 - b) Evaluate the triple Integral $\int_0^2 \int_0^2 \int_0^{yz} xyz dx dy dz$.
 - c) Evaluate $\int_0^1 \int_x^2 dy dx$
 - d) State homogeneous function.
 - e). If $f(x, y) = x^2y + xy^3 - 3x + 4y - 6$, find $\frac{\partial f}{\partial x}$
 - f) Define conditionally convergent series.
 - g) State Integral Test.
 - h) Compute $\Gamma\left(-\frac{3}{2}\right)$.
 - i) Prove symmetry of beta function.
 - j) State Taylor's theorem.

SECTION - B

2. Show that the function $\int_0^{\infty} x^{n-1} e^{-x} dx$ is convergent if and only if $n > 0$.
3. Test the convergence of $x + \frac{2^2 x^2}{2!} + \frac{3^3 x^3}{3!} + \frac{4^4 x^4}{4!} + \dots \infty$.
4. Discuss the convergence or divergence of the series $\sum \frac{n^p}{(n+1)^q}$.
5. Find the volume of the solid generated by revolving the curve $x = 2t + 3$, $y = 4t^2 - 9$ about the x axis for $2t = -3$ to $2t = 3$.

SECTION-C

6. If $\theta = t^n e^{\frac{-r^2}{4t}}$, find the value of n which will make $\frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial \theta}{\partial r} \right) = \frac{\partial \theta}{\partial t}$.

7. If $U = C \operatorname{osec}^{-1} \left(\frac{x^{\frac{1}{2}} + y^{\frac{1}{2}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}} \right)^{\frac{1}{2}}$, Prove that

$$x^2 \frac{\partial^2 U}{\partial y^2} + 2xy \frac{\partial^2 U}{\partial x \partial y} + y^2 \frac{\partial^2 U}{\partial x^2} = \frac{13 + \tan^2 U}{144}$$

8. Find the volume common to the cylinders $x^2 + y^2 = a^2$ and $x^2 + z^2 = a^2$.
9. Evaluate $\iint (x^2 + y^2) dx dy$ throughout the area enclosed by the curve
 $y = 4x$, $x + y = 3$, $y = 0$ and $y = 2$.

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Roll No.

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Total No. of Pages : 02

Total No. of Questions : 09

B. Tech. (AE/ AI & ML/EEE/ CE/ CSE/ EE/ ECE/ IT/ ME/ Internet of Things and Cyber Security including Block Chain Technology) (Sem.-1,2)

CHEMISTRY-I

Subject Code : BTCH-101-18

M.Code : 75343

Date of Examination : 29-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Answer briefly :

- a. What are dipole-dipole interactions? Explain.
- b. Give one example of hard and soft acid.
- c. Why TMS is used as an internal standard in NMR Spectroscopy?
- d. What is Dry corrosion? Explain.
- e. What is Markownikof's rule? Explain by giving example.
- f. Differentiate between ionization Isomerism and Hydrate Isomerism.
- g. Which of the following will show IR spectrum?

O_2 , N_2 , HI, CO_2

- h. How is entropy related to free energy?
- i. Calculate the bond order of O_2 and O_2^+ .
- j. What is absolute configuration?

SECTION - B

2. a. Draw the molecular orbital energy level diagram of CO molecule.
b. Differentiate between n-type and p-type semiconductors.
3. a. Discuss in detail Crystal field splitting in octahedral complexes.
b. What is Aufbau Principle?
4. a. Explain the process of Fluorescence and phosphorescence with the help of Jablonski diagram.
b. Differentiate between scattering and diffraction.
5. a. Derive expression for the calculation of V_c , P_c and T_c in terms of van der waal's constant.
b. Explain the deviation of real gases from ideal behavior.

SECTION - C

6. a. What is corrosion? Discuss mechanism of dry corrosion.
b. Calculate the emf of the cell $\text{Zn} / \text{Zn}^{2+} (0.001\text{M}) \parallel \text{Cu}^{2+} (0.1\text{M}) / \text{Cu}$. The standard potential of Cu/Cu^{2+} half-cell is +0.34 V and Zn/Zn^{2+} is 0.76 V.
7. a. What is ionization energy? Which elements have the highest ionization energy? How ionization energy shows variation along the period and down the group?
b. What is the difference between oxidation number and oxidation state?
8. a. Describe the conformational analysis of butane.
b. What is enantiomerism? Explain the requirement for enantiomerism.
9. Explain the following terms :
 - a) Elimination reaction with mechanism.
 - b) Ring Cyclization reaction.

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2. Write an original story which begins with :

It was raining heavily and as i moved quickly towards the deserted building _____.

3. The Government of India is concerned about the steady increase in the outbreak of diseases among working class. In order to work on the possible solutions, the Health Minister has asked the chief medical office, to find out the possible causes for these diseases, the problems faced and other related factors. On the basis of the following data, as CMO prepare a report to be submitted to Health Minister.

Data showing diseases and the suffering people

Sr.No.	Name of the Disease	Percentage of people suffering
1	Diabetes	25%
2	Blood Pressure	20%
3	Stress	35%
4	Migraine	10%
5	Asthma	5%
6	Cervical	5%

4. Write a letter to the manager of the company mentioning details of your order and describing the damage and missing goods. Also write what you want the company to do for compensation.
5. Write an essay in about 500 words on the topic Social media.

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Roll No.

Total No. of Pages : 04

Total No. of Questions : 09

B.Tech. (AI&ML/AI&DS/CE/CSE/IT/DS) (Internet of Things and Cyber Security including Block Chain Technology) (Sem.-1)

MATHEMATICS-I

Subject Code : BTAM-104-18

M.Code : 75362

Date of Examination: 14-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions EACH from SECTION - B & C.

SECTION - A

1. Explain briefly :

- a) Verify Lagrange's Mean value theorem for $f(x) = e^x$ in $[0, 1]$.

- b) Show that $\sin x (1 + \cos x)$ has a maximum when $x = \pi/3$.

- c) Evaluate $\int_0^{\infty} x^2 e^{-x^2} dx$.

- d) Determine the rank of the matrix $A = \begin{bmatrix} 1 & 4 & 5 \\ 2 & 6 & 8 \\ 3 & 7 & 22 \end{bmatrix}$.

- e) If $A = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$ verify that $AA^T = I = A^T A$, where I is the unit matrix.

- f) For what values of k , do the following sets of vectors form a basis in $\mathbb{R}^3$: $\{(k, 1-k, k), (0, 3k-1, 2), (-k, 1, 0)\}$.

- g) State $\text{ran}(T)$ and $\text{ker}(T)$ of a linear transformation $T : V \rightarrow W$. State rank-nullity theorem.

h) Examine whether the matrix A is similar to the matrix B where $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

and $B = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$.

i) Express the matrix $A = \begin{bmatrix} 2 & 1 & 3 \\ -3 & 4 & -1 \\ -1 & 1 & 2 \end{bmatrix}$ as sum of symmetric and skew-symmetric matrices.

j) Show that the eigen values of symmetric matrix are real.

SECTION - B

2. a) Expand $\log(1+x)$ by Maclaurin's series.

b) Evaluate $\lim_{x \rightarrow 0} \frac{e^x - e^{\sin x}}{x - \sin x}$.

3. a) 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 y -axis.

b) Prove that $\beta(m, n) = \int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx$.

4. a) Solve the equations $3z + y + 2z = 3$, $2x - 3y - z = 3$, $x + 2y + z = 4$ by Cramer's rule.

b) Using the Gauss-Jordan method, find the inverse of the matrix :

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$$

5. a) Are the following vectors linearly dependent. If so, find the relation between them : $\{(1, 1, 1, 3), (1, 2, 3, 4), (2, 3, 4, 9)\}$.
- b) Investigate for what values of λ and μ , the simultaneous equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + \lambda z = \mu$, have no solution, a unique solution and an infinite number of solutions.

SECTION - C

6. a) Let T be a transformation from $\mathbb{R}^3$ into $\mathbb{R}^1$ defined by $T(x_1, x_2, x_3) = x_1^2 + x_2^3 + x_3^2$. Show that T is not a linear transformation.
- b) Find $\ker(T)$ and $\text{ran}(T)$ and their dimensions for

$$T: \mathbb{R}^2 \rightarrow \mathbb{R}^3; T \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2x + y \\ y - x \\ 3x + 4y \end{pmatrix}.$$

7. a) Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ be a linear transformation defined by $T \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} y + z \\ y - z \end{pmatrix}$.

Determine the matrix of the linear transformation T , with respect to the standard basis

$$X = \left\{ \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \right\} \text{ in } \mathbb{R}^3 \text{ and } Y = \left\{ \begin{pmatrix} 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \end{pmatrix} \right\} \text{ in } \mathbb{R}^2.$$

- b) If x, y, z are linearly independent vectors in $\mathbb{R}^3$ then show that $x + y, y + z, z + x$ are also linearly dependent in $\mathbb{R}^3$.

8. a) Find the eigen values and the corresponding eigen vectors of the matrix :

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 2 & 1 \\ -1 & 2 & 2 \end{bmatrix}$$

- b) The eigen vectors of a 3×3 matrix A corresponding to the eigen values 2, 2, 4 are $(-2, 1, 0)^T$, $(-1, 0, 1)^T$, $(1, 0, 1)^T$ respectively. Find the matrix A .

9. Show that the matrix $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ is diagonalizable. Hence find P such that $P^{-1}AP$ is a diagonal matrix.

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Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (CSE/CE/ME/ECE/EE/EEE) (Sem-1)

MATHEMATICS-I

Subject Code : BTAM-101-18

M.Code : 75353

Date of Examination : 14-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Write briefly :

- Verify Rolle's theorem for $f(x) = \frac{\sin x}{e^x}$ in $(0, \infty)$.
- Expand $e^{\sin x}$ by Maclaurin's series.
- Test the curve $y = x^4$ for points of inflexion.
- Find the equation of the tangent plane and normal to the surface $z^2 = 4(1 + x^2 + y^2)$ at $(2, 2, 6)$.
- Change the order of integration of the integral $\int_0^{2a} \int_4^{x^{2/4a}} f(x, y) dy dx$.
- Discuss the convergence of the series $\sum_{n=1}^{\infty} \sqrt{\frac{2^n - 1}{2^n + 1}}$.

g) Discuss p-test for infinite series with example.

h) Find the eigen values and the corresponding eigen vectors of the matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

i) Define orthogonal matrix with example.

j) Define similar matrices with example.

SECTION - B

2. a) Prove that $\log(1+x) = \frac{x}{1+\theta x}$, where $0 < \theta < 1$ and hence deduce that

$$\frac{x}{1+x} < \log(1+x) < x, x > 0.$$

b) Evaluate $\lim_{x \rightarrow 0} \frac{xe^x - \log(1+x)}{x^2}$.

3. a) Show that the semi-vertical angle of a cone of maximum volume and given slant height is $\tan^{-1} \sqrt{3}$.

b) Find the volume formed by the revolution of loop of the curve $y^2(a+x) = x^2(3a-x)$, about the x -axis.

4. a) Show that the rectangular solid of maximum volume that can be inscribed in a sphere is a cube.

b) If $x^2 + y^2 + z^2 - 2xyz = 1$, show that $\frac{dx}{\sqrt{1-x^2}} + \frac{dy}{\sqrt{1-y^2}} + \frac{dz}{\sqrt{1-z^2}} = 0$.

5. a) Evaluate $\iint_A xy \sqrt{1-x-y} \, dx \, dy$ where A is the region bounded by $x = 0$, $y = 0$ and $x + y = 1$ using the transformation $x + y = u$, $y = uv$.

b) Find the centre of gravity of the cardioids $r = a(1 + \cos \theta)$.

SECTION - C

6. Discuss the convergence of the series $\frac{x}{1} + \frac{1}{2} \frac{x^3}{3} + \frac{1.3}{2.4} \frac{x^5}{5} + \frac{1.3.5}{2.4.6} \frac{x^7}{7} + \dots (x > 0)$.

7. a) Discuss the convergence of $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{2n-1}$.

b) Find the radius of convergence of the power series $\sum_{n=1}^{\infty} \frac{n!}{n^n} x^n$.

8. a) Investigate the values of λ and μ so that the equations

$2x + 3y + 5z = 9$, $7x + 3y - 2z = 8$, $2x + 3y + \lambda z = \mu$ have no solution, a unique solution and an infinite number of solutions.

b) Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$

9. a) If A is a square matrix show that $A + A^T$ is symmetric and $A - A^T$ is skew-symmetric matrix.

b) Verify the Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 3 & -1 \\ -2 & -1 & 1 \end{bmatrix}$. Find A^{-1} if it exists.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE) (Sem.-1)

ELEMENTS OF MECHANICAL ENGINEERING

Subject Code : BTME-101

M.Code : 54101

Date of Examination : 10-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Answer briefly :
 - a) Define "system" in thermodynamics.
 - b) What is the "zeroth law of thermodynamics"?
 - c) Distinguish between specific heat and latent heat.
 - d) What do you mean by free expansion? Give example.
 - e) Why efficiency of a heat engine is always less than 100%?
 - f) Define the term "compression ratio" in the context of gas power cycles.
 - g) What is the purpose of the "intake valve" and "exhaust valve" in an I.C. engine?
 - h) Discuss the significance of "strength" as a mechanical property.
 - i) Explain the primary difference between ferrous and non-ferrous metals.
 - j) What do you mean by centre of gravity? Discuss with an example.

SECTION - B

2. a) Differentiate between open system, closed system and an isolated system.
b) To a closed system, 150 kJ of work is supplied. If the initial volume is 0.6 m^3 and pressure of the system changes as $p = 8 - 4V$, where p is in bar and V is in m^3 , determine the final volume and pressure of the system.
3. Define first law of thermodynamics showing its validity experimentally and discuss its essence and corollaries in detail.
4. a) Distinguish between Heat Engine, Heat Pump and Refrigerator with suitable diagrams. Also, give their real examples.
b) Find the co-efficient of performance and heat transfer rate in the condenser of a refrigerator in kJ/h which has a refrigeration capacity of 12000 kJ/h when power input is 0.75 kW.
5. a) Discuss the philosophy and concept of entropy.
b) Show that entropy is property of the system.

SECTION - C

6. Derive an expression for air standard efficiency of Diesel Cycle.
7. a) Explain the following properties of engineering materials
i) Ductility ii) Resilience iii) Weldability iv) Hardness.
b) What do you mean by composite materials? Distinguish between fibre reinforced and metal matrix composites.
8. a) Locate the centroid of a T-section $10 \text{ cm} \times 10 \text{ cm} \times 2 \text{ cm}$.
b) Find the mass moment of inertia of circular ring of radius R and mass M .
9. Explain construction and working of four stroke diesel engine with a neat diagram.

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Total No. of Pages : 02

Total No. of Questions : 09

**B. Tech. (AE/AI & ML/ AI & DS / A&R/CE/CSE/DS/EE/ECE/
FT/IT/ME/Internet of Things and Cyber Security including Block Chain
Technology)(Sem.-1,2)**

ENGINEERING GRAPHICS & DESIGN

Subject Code : BTME101-21

M.Code : 91335

Date of Examination : 06-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Write a short notes on :
 - a) How will you represent Glass and Wood on a drawing sheet?
 - b) Show by the means of traces, a plane perpendicular to both HP and VP.
 - c) Explain with the help of an example the Aligned system of placement of dimensions.
 - d) Draw a regular Pentagonal Lamina of side 55mm.
 - e) Explain the types of methods of Dimensioning with a suitable drawing.
 - f) Draw the projections of a line inclined to VP and parallel to HP with a suitable freehand drawing. Assume suitable dimensions. Also, show traces.
 - g) Draw the projections of a line lying on a Profile Plane whose top view is larger than its front view. Which angle is bigger " θ " or " ϕ "? Show with the help of a suitable free hand drawing.
 - h) Explain Frustum and Truncated Solids with a suitable drawing.
 - i) Print the following statement with single stroke capital vertical letters of height 10mm :

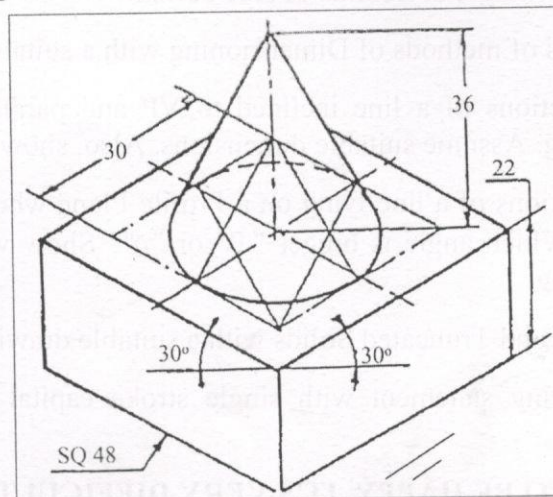
IT'S SIMPLE TO BE HAPPY, IT'S VERY DIFFICULT TO BE SIMPLE
 - j) Explain the importance of a title block.

SECTION - B

2. Construct a Diagonal Scale of R. F= 1:5000 to read up to single meter and long enough to measure up to 600m. Assume suitably any missing data.
3. A point "M" is 65 mm in front of VP and 52 mm above HP. Draw its projections and find out its shortest distance from the reference line.
4. Plan and elevation of a line "AB" 60mm long, measure 54mm and 45 mm respectively. End A is 15mm from HP and 10mm from VP. Draw its projections and determine its inclinations to the reference planes when the line lies in First quadrant.
5. End "A" of line AB is 15 mm above HP and 48 mm in front of VP and end "B" 13 mm behind the VP and 28 mm below the HP. The end projectors are 52 mm apart. Draw the projections and find TL, θ , Φ , HT and VT.

SECTION - C

6. A regular hexagonal lamina of side 45 mm having a central circular hole of diameter 45 mm is resting on one of its corners on VP such that one of its base edges is perpendicular to VP. Draw its projections when the said lamina is parallel to HP.
7. A right regular triangular prism of base edge 40mm, axis 65mm long is resting on its rectangular face on HP, with axis parallel to both HP and VP. Draw its projections.
8. A right regular square pyramid of base edge 45 mm and axis 52 mm long; rests on its base on HP with its base edges equally inclined to VP. Draw its projections assuming the pyramid in 1st quadrant.
9. Draw isometric Projections of the following :



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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (CE, EEE, IT, ME) (Sem. – 1,2)

ENGINEERING DRAWING

Subject Code: BTME-102

M Code: 54102

Date of Examination : 06-05-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each, carrying EIGHT marks each.
3. Attempt any FIVE questions from SECTION B & C, selecting atleast TWO questions from each of these SECTIONS B & C.

SECTION-A

1. Write short notes on:
- Explain full and half section view with a free hand drawing.
 - Show by means of traces, a plane parallel to VP.
 - Explain the importance of studying intersection of surfaces/solids in engineering applications.
 - How will you represent Metal and Wood on a drawing sheet?
 - Explain the types of dimensions with a suitable freehand drawing.
 - Draw projections of a line inclined to HP and lying on VP with a suitable freehand drawing. Also, show traces.
 - Differentiate Isometric Projection and Isometric Drawing.
 - Define and explain development of surfaces.
 - Write the following statement using single stroke capital vertical letters of 10 mm size:
"LIFE IS NOT A PROBLEM TO BE SOLVED, BUT A REALITY TO BE EXPERIENCED."
 - Explain Frustum and Truncated Solids with a suitable freehand drawing.

SECTION - B

2. The distance between Delhi and Agra is 200 km. On a railway map it is represented by a line 05 cm long. Find its R.F and draw a diagonal scale to show single km and long enough to read up to 600 km.
3. A circular lamina of diameter 70mm (having a central hexagonal hole of side 20mm) is inclined to VP at 42° and perpendicular to HP. It is resting on VP on a point of its circumference. One of the sides of the hexagonal hole is perpendicular to HP. Draw its projections assuming the object lying in first quadrant.
4. A right regular Pentagonal prism of base edge 37mm, axis 65 mm long is resting on its rectangular face on HP, with axis parallel to both HP and VP. Draw its projections.
5. End "C" of line CD is 16 mm below HP and 42 mm behind VP and end "D" 10 mm in front of VP and 29 mm above HP. The end projectors are 52 mm apart. Draw the projections and find TL, θ , ϕ , HT and VT.

SECTION - C

6. A right regular Cone of base diameter 52mm and height 82mm rests on its base on HP, the cutting plane parallel to HP and an Auxiliary Vertical Plane (AVP) inclined to VP at 35° cuts the cone at 12mm from the axis. Draw its sectional front view and top view.
7. A right regular rectangular pyramid at base 42×30 mm and height 65mm rests on its base on HP with one of the base edges parallel to VP. A section plane perpendicular to VP and inclined to HP at 35° cuts the pyramid bisecting its axis. Develop the lateral surface of the truncated pyramid.
8. A cylinder 45mm diameter and 65mm long axis resting on HP on its base is completely penetrated by another cylinder of 35 mm diameter and 62 mm long axis horizontally- Both axes intersect & bisect each other. Draw projections showing curves of intersections.
9. Draw the isometric drawing of the Frustum of a right regular hexagonal pyramid, side of the base hexagon is 35 mm, side of top hexagon is 20 mm, and the height of the frustum is 40 mm resting on its base on HP with an edge of the base parallel to VP.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AI&OS/AI&ML/Block Chain/Internet of Things and Cyber Security including Block Chain Technology/CE/CSE/CS/IOT/CSD/EEE/ECE/EE/ETE/ME/ECS/IT/Food Technology/Robotics & AI/ Block Chain Technology) (Sem.-1,2)

CHEMISTRY-I

Subject Code : BTCH101-23

M.Code : 93800

Date of Examination : 20-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION-A

I. Write briefly :

- a) Define aromaticity and give one example of an aromatic molecule.
- b) Draw the pi-molecular orbital's of buta-diene.
- c) What is spin-spin coupling in NMR?
- d) In ^1H NMR spectroscopy, what is meant by chemical shift?
- e) What are Van der Waals interactions, and how do they differ from ionic and dipolar interactions?
- f) List any three factors that affect the rate of corrosion.
- g) How do atomic and ionic sizes change across a period and down a group in the periodic table?
- h) Why do noble gases have positive electron gain enthalpies?
- i) What is the difference between enantiomers and diastereomers?
- j) What is the difference between electrophilic and nucleophilic, substitution reactions?

SECTION - B

2. a) What is the effect of doping on the band structure of semiconductors and how does it influence their electrical conductivity?
b) Explain how d-orbitals split in a tetrahedral crystal field. Why is crystal field splitting in a tetrahedral environment lower than in an octahedral environment?
3. a) Derive the Schrodinger wave equation and explain the physical significance of Ψ and Ψ^2 .
b) What is the principle behind electronic spectroscopy, and what types of electronic transitions can occur in molecules?
4. a) What factors influence the value of $\lambda_{\max}$ and the intensity of spectral lines?
b) What is the principle of NMR spectroscopy? Explain.
5. a) Define the critical point of a substance and explain the relationship between critical constants and the van der Waals constants.
b) How does the behavior of real gases deviate from ideal gas behavior at high pressure or low temperature?

SECTION - C

6. a) What are the various problems associated with hard water and how does it affect daily life?
b) State the Nernst equation and explain its application in calculating cell potentials.
7. a) What is the effective nuclear charge, and how does it affect the behavior of electrons in an atom?
b) How does electronegativity influence the polarity of chemical bonds?
8. a) Give the conformational analysis of Propane by drawing the potential energy diagram for various conformations of it.
b) **Explain :**
 - i. Chirality
 - ii. Optical activity
9. What is an electrophilic addition reaction, and how does it differ from nucleophilic addition? Explain by giving suitable examples.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CSE/IT/AI&DS/AI&ML/Block Chain/CE/Cyber Security/DS/CSE(IOT)/CSD/EEE/DS/EE/ECE(Industry Integrated)/ETE/ECS/ME/Robotics&AI/(Internet of Things and Cyber Security including Block Chain Technology) (Sem.-1, 2)

PROGRAMMING FOR PROBLEM SOLVING

Subject Code : BTPS101-18

M.Code : 93803

Date of Examination :23-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Write a short notes on :

- Discuss the role of operating system.
- List various symbols used in flowchart.
- Differentiate between syntax error and logical error.
- Differentiate between while and do while loop.
- How can we find if the two strings are same or not?
- What are library functions? Give an example.
- What is recursion? Give an example of recursive function.
- How much memory is allocated to structure object? Explain with the help of an example.
- Write code to create a pointer, save the address of a variable in that pointer and print the value of that variable using pointer.
- Explain various types of logical operators with the help of an example each.

SECTION - B

2. Explain various methods of passing arguments to a function.
3. Write a program to create a student structure with 4 members. Accept input and then display the contents of that structure.
4. What is flowchart? Explain different symbols of flowchart. Draw a flowchart that finds the largest of three numbers.
5. Explain different data types used in C programming language.

SECTION - C

6. What is sorting? Explain bubble sorting.
7. **Explain :**
 - a. Different types of memories.
 - b. Algorithm with the help of an example.
8. Explain in detail various conditional statements in C programming language.
9. What is file handling? Explain various functions to manage the files in C programming language.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ECE/CSE) (Sem.-1,2)

SEMI-CONDUCTOR AND OPTOELECTRONICS PHYSICS

Subject Code : BTPH-105-18

M.Code : 75363

Date of Examination : 23-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Write briefly :
 - a. Distinguish between direct and indirect band gap.
 - b. What is effective mass?
 - c. At what temperature we can expect a 10% probability that electrons in silver have an energy which is 1% above the Fermi energy? The Fermi energy of silver is 5.0 eV.
 - d. Write a note on Ohmic junctions.
 - e. What do you understand from carrier generation and recombination?
 - f. Distinguish between Spontaneous and Stimulated emission.
 - g. Discuss non-Radiative recombination mechanism.
 - h. When a laser has 1 V applied to it, it draws 10 mA and produce 1 mW of optical power. What is the efficiency of laser?
 - i. What are the necessary conditions for applying Van der Pauw method?
 - j. What information can be obtained from capacitance-voltage measurement?

SECTION - B

2. a) Obtain the expression for density of states in 3D.
b) Calculate the fermi energy of sodium at 0K assuming that it has one free electron per atom and density of sodium is 970 kg/m^3 and atomic weight is 23.
3. State Bloch's theorem for particles in a periodic potential? Explain the origin of energy bands using Kronig-Penny model.
4. Discuss the VI characteristics of a p-n junction. Draw circuit diagram and explain the different features of VI characteristics.
5. Obtain the expression for carrier concentration in extrinsic semiconductor.

SECTION - C

6. Explain the principle, construction and working of a hetero-junction semiconductor laser with diagram. Discuss the merits of heterojunction semiconductor laser.
7. What is photo-detector? Explain the principle, construction and working of p-n photodiode. Discuss its disadvantages.
8. What is Four-point probe method? How to calculate the band gap using Four-point probe method?
9. Explain any method to measure the wavelength of monochromatic light. Can the same method be used for measuring wavelength of white light?

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

Total No. of Questions: 09
B.Tech. (AE/AI&ML/AI&DS/EE/ECE/EEE/FT/IT/CSE/AI/CE/ME/Automation & Robotics/Internet of Things and Cyber Security including Block Chain Technology) (Sem.-1,2)

BASIC ELECTRICAL ENGINEERING

Subject Code: BTEE-101-18

M.Code : 75339

Date of Examination : 27-05-2025

Time : 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES :

- INSTRUCTIONS TO CANDIDATES :**
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
 2. SECTION - B & C. have FOUR questions each.
 3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
 4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Answer following questions in brief :
- What are the various losses in a single-phase transformer?
 - State and explain the Kirchoff's current law.
 - What is the function of a contactor in electric circuits?
 - What are voltage and current relation in star and delta connections?
 - Draw the Thevenin's equivalent circuit. What is Thevenin's impedance?
 - Explain the working principle of a single-phase induction motor.
 - What are the various types of electrical loads?
 - What is the need of power factor improvement in the electric systems? How it is carried out?
 - Draw the electric circuit of an auto-transformer.
 - Draw the power triangle. Explain it.

SECTION - B

2. Draw and explain the electric circuit of a miniature circuit breaker.
3. A coil takes a current of 6 A, when connected to a 24 V DC supply. To obtain the same current with a 50 Hz AC supply, the voltage required was 30 V. Calculate :
 - a) The inductance of the coil.
 - b) The power factor of the coil.
4. The power input to a 3-phase induction motor is 80 kW. The stator losses total 1.5 kW. Find the total mechanical power developed, if the motor is running with a slip of 4%.
5. State and explain the Superposition theorem, with an example.

SECTION - C

6. Derive time-domain voltage-current relations for first order RC circuit.
7. A 200 kVA, 3300/240 V, 50-Hz single-phase transformer has 80 turns on the secondary winding. Assume an ideal transformer.

Calculate :

- a) Primary and secondary current on full load
 - b) The maximum value of flux
 - c) The number of primary turns.
8. Derive an equation for resonant frequency for a parallel RLC circuit.
 9. **Write a short note on :**
 - a) Types of batteries and their characteristics
 - b) Earthing and its need.

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Total No. of Pages : 04

Total No. of Questions : 11

B.Arch / B.Tech. (ME) (Sem.-1,2)

HUMAN VALUES AND PROFESSIONAL ETHICS

Subject Code : HVPE-101

M.Code : 10049

Date of Examination : 27-05-2025

Time : 2 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Section-A is compulsory TEN questions ONE mark each.
3. Section-B contains FIVE questions of FIVE marks each attempt any FOUR.
4. Section-C contains FIVE questions with internal choice of TEN marks each attempt all.

SECTION-A

(10 × 1 = 10)

1. Write briefly :

i) What do you mean by values or human values?

ਮੂਲ्यों ਯਾ ਮਾਨਵੀਯ ਮੂਲ्यों ਸੇ ਆਪ ਕਯਾ ਸਮਝਦੇ ਹੋ?

ਕਦਰਾਂ-ਕੀਮਤਾਂ ਜਾਂ ਮਨੁੱਖੀ ਕਦਰਾਂ-ਕੀਮਤਾਂ ਤੋਂ ਤੁਹਾਡਾ ਕੀ ਭਾਵ ਹੈ?

ii) What is innateness?

ਸਵਾਭਾਵਿਕਤਾ ਕਯਾ ਹੈ?

ਸਵਾਭਾਵਿਕਤਾ ਕੀ ਹੈ?

iii) What is Mutual Fulfilment?

ਪਾਰਸਪਰਿਕ ਪੂਰਤਿ ਕਯਾ ਹੈ?

ਆਪਸ ਦੀ ਪੂਰਤੀ ਕੀ ਹੈ?

iv) What is Skill ?

ਕੌਸ਼ਲ ਕਯਾ ਹੈ?

ਹੁਨਰ ਕੀ ਹੈ?

v) What is Artistic-Value?

ਕਲਾਤਮਕ-ਮੂਲਯ ਕਯਾ ਹੈ?

ਕਲਾਤਮਿਕ-ਮੁੱਲ ਕੀ ਹੈ?

vi) What is the value of any unit in the larger order?

ਕੱਢੇ ਆਦੇਸ਼ ਮੇਂ ਕਿਸੀ ਭੀ ਇਕਾਈ ਕਾ ਕਯਾ ਮੂਲਯ ਹੈ?

ਵੱਡੇ ਆਦੇਸ਼ ਵਿੱਚ ਕਿਸੇ ਵੀ ਇਕਾਈ ਦਾ ਕੀ ਮੁੱਲ ਹੈ?

vii) What is Existence?

ਅਸਤਿਤਵ ਕਯਾ ਹੈ?

ਅਸਤੀਤਵ ਕੀ ਹੈ?

viii) What is Perseverance?

ਅਟਲਤਾ ਕਯਾ ਹੈ?

ਧੀਰਜ ਕੀ ਹੈ?

ix) What is Material Order?

ਸਾਮਗਰੀ ਆਦੇਸ਼ ਕਯਾ ਹੈ?

ਸਾਮਗਰੀ ਆਦੇਸ਼ ਕੀ ਹੈ?

x) How the value "care" is related with body?

ਮੂਲਯ "ਧਿਆਨ" ਸ਼ਰੀਰ ਕੇ ਸਾਥ ਕੈਸੇ ਸੰਬੰਧਿਤ ਹੈ।

ਮੁੱਲ ਧਿਆਨ ਸਰੀਰ ਦੇ ਨਾਲ ਕਿਵੇਂ ਸਬੰਧਤ ਹੈ?

SECTION-B

(4 × 5 = 20)

2. Explain the process of self-exploration with the help of a suitable diagram.

ਏਕ ਤਪਯੁਕਤ ਆਰੇਖ ਕੀ ਮਦਦ ਸੇ ਆਤਮ-ਅਨ੍ਵੇਸ਼ਣ ਕੀ ਪ੍ਰਕ੍ਰਿਯਾ ਕੋ ਸਮਝਾਇਏ।

ਇੱਕ ਢੁਕਵੇਂ ਚਿੱਤਰ ਦੀ ਮਦਦ ਨਾਲ ਆਤਮ-ਅਧਿਐਨ ਦੀ ਪ੍ਰਕਿਰਿਆ ਨੂੰ ਸਮਝਾਓ।

3. Explain Natural Acceptance.

ਸਹਜ ਸਵੀਕ੍ਰਿਤਿ ਸਮਝਾਓ।

ਕੁਦਰਤੀ ਮੰਜੂਰੀ ਸਮਝਾਓ।

4. Explain harmony in family?

ਪਰਿਵਾਰ ਮੇਂ ਤਾਲਮੇਲ ਕੇ ਬਾਰੇ ਮੇਂ ਕਥਾਓ।

ਪਰਿਵਾਰ ਵਿੱਚ ਤਾਲਮੇਲ ਦੇ ਬਾਰੇ ਵਿੱਚ ਦੱਸੋ।

5. What do you mean by Animal Consciousness and Human Consciousness ? How is the transformation possible from Animal Consciousness to human Consciousness?

ਆਪਕਾ ਪਸ਼ੂ ਚੇਤਨਾ ਔਰ ਮਾਨਵ ਚੇਤਨਾ ਸੇ ਕਯਾ ਸਤਲਕ ਹੈ? ਪਸ਼ੂ ਚੇਤਨਾ ਸੇ ਮਾਨਵ ਚੇਤਨਾ ਕੇ ਲਿਏ ਪਰਿਵਰਤਨ ਕੈਸੇ ਸੰਭਵ ਹੈ ?

ਤੁਹਾਡਾ ਪਸ਼ੂ ਚੇਤਨਾ ਅਤੇ ਮਨੁੱਖੀ ਤੋਂ ਕੀ ਮਤਲਬ ਹੈ? ਪਸ਼ੂ ਚੇਤਨਾ ਤੋਂ ਮਨੁੱਖੀ ਚੇਤਨਾ ਤੱਕ ਦੀ ਤਬਦੀਲੀ ਕਿਸ ਤਰ੍ਹਾਂ ਸੰਭਵ ਹੈ?

6. What is the need of Value-Education?

ਮੂਲ ਧਾਰਮਿਕ ਸਿੱਖਿਆ ਦੀ ਕੀ ਜ਼ਰੂਰਤ ਹੈ?

ਮੁੱਲ ਸਿੱਖਿਆ ਦੀ ਕੀ ਜ਼ਰੂਰਤ ਹੈ?

SECTION-C

(5 × 6 = 30)

7. Describe basic human aspirations. What are the requirements to fulfill basic human aspirations?

ਬੁਨਿਆਦੀ ਮਾਨਵੀ ਆਕਾਂਸ਼ਾਵਾਂ ਕੀਆਂ ਹਨ? ਬੁਨਿਆਦੀ ਮਾਨਵੀ ਆਕਾਂਸ਼ਾਵਾਂ ਨੂੰ ਪੂਰਾ ਕਰਨੇ ਲਈ ਆਵਸ਼ਯਕਤਾਵਾਂ ਦੀ ਵਰਤੋਂ ਕਰੋ?

ਬੁਨਿਆਦੀ ਮਾਨਵੀ ਇੱਛਾਵਾਂ ਕੀ ਹਨ? ਬੁਨਿਆਦੀ ਮਾਨਵੀ ਇੱਛਾਵਾਂ ਨੂੰ ਪੂਰਾ ਕਰਨ ਲਈ ਜ਼ਰੂਰਤਾਂ ਦੀ ਵਰਤੋਂ ਕਰੋ?

OR

'Human being is co-existence of Self and body', explain.

'ਮਨੁੱਖ ਸਵਯੰ ਅਤੇ ਸਰੀਰ ਦਾ ਸਹ-ਅਸਤਿਤਵ ਹੈ', ਸਮਝਾਓ।

'ਇਨਸਾਨ ਮੈਂ ਅਤੇ ਸਰੀਰ ਦਾ ਸਹਿ-ਅਸਤਿਤਵ ਹੈ', ਸਮਝਾਓ।

8. What is the meaning and purpose of Self-Exploration ?

ਸਵਯੰ-ਅਨੁਵੇਸ਼ਣ ਦਾ ਅਰਥ ਅਤੇ ਉਦੇਸ਼ ਕੀ ਹੈ?

ਆਤਮ-ਅਧਿਐਨ ਦੇ ਮਤਲੱਬ ਅਤੇ ਉਦੇਸ਼ ਕੀ ਹੈ?

OR

What are the problems we are facing today because of operating on the basis of pre-conditioned desires?

ਪੂਰਵ-ਮਾਨਤਾ ਇੱਛਾਵਾਂ ਦੇ ਆਧਾਰ 'ਤੇ ਚੱਲਣ ਕਰਕੇ ਅੱਜ ਅਸੀਂ ਕਿਹੜੀਆਂ ਸਮੱਸਿਆਵਾਂ ਦਾ ਸਾਮਣਾ ਕਰ ਰਹੇ ਹਾਂ?

ਪੂਰਵ-ਮਾਨਤਾ ਇੱਛਾਵਾਂ ਦੇ ਆਧਾਰ 'ਤੇ ਚੱਲਣ ਕਰਕੇ ਅੱਜ ਅਸੀਂ ਕਿਹੜੀਆਂ ਸਮੱਸਿਆਵਾਂ ਦਾ ਸਾਮਣਾ ਕਰ ਰਹੇ ਹਾਂ?

9. What do you mean by universal human order ? What could be your role in moving towards it ?

ਆਪ ਸਾਰਵਭੌਮਿਕ ਮਾਨਵੀ ਆਦੇਸ਼ ਕੀਆਂ ਹਨ? ਇਸਦੇ ਅਧੀਨ ਆਪਣੀ ਭੂਮਿਕਾ ਕੀ ਹੋ ਸਕਦੀ ਹੈ?

ਤੁਸੀਂ ਸਾਰਵਭੌਮਿਕ ਮਾਨਵੀ ਆਦੇਸ਼ ਵਲੋਂ ਕੀ ਸਮਝਦੇ ਹੋ? ਇਸ ਵਿੱਚ ਆਪਣੀ ਭੂਮਿਕਾ ਕੀ ਹੋ ਸਕਦੀ ਹੈ?

OR

Explain Competence in Professional-Ethics.

ਪੇਸ਼ੇਵਰ ਨੈਤਿਕਤਾ ਮੇਂ ਕਸ਼ਮਤਾ ਸਮਝਾਓ।

ਪੇਸ਼ੇਵਰ ਨੈਤਿਕਤਾ ਵਿੱਚ ਸਮਰੱਥਾ ਸਮਝਾਓ।

10. What do you mean by Respect? What are the different patterns of differentiation?

ਆਪ ਕਾ ਸਮਮਾਨ ਸੇ ਕਯਾ ਸਤਲਕ ਹੈ? ਭੇਦਭਾਵ ਕੇ ਵਿਭਿੰਨ ਪੈਟਰਨ ਕਯਾ ਹੈਂ?

ਤੁਹਾਡਾ ਆਦਰ ਦਾ ਕੀ ਮਤਲਬ ਹੈ? ਫਰਕ ਦੇ ਵੱਖ-ਵੱਖ ਪੈਟਰਨ ਕੀ ਹਨ?

OR

What is happiness ? What is the wrong notion about attaining happiness? What are the problems faced due to the wrong notions about happiness and prosperity?

ਸੁਖ ਕਯਾ ਹੈ? ਖੁਸ਼ੀ ਕੋ ਪ੍ਰਾਪਤ ਕਰਨੇ ਕੇ ਬਾਰੇ ਮੇਂ ਗਲਤ ਧਾਰਨਾ ਕਯਾ ਹੈ? ਸੁਖ ਔਰ ਸਮ੍ਰੱਧਿ ਕੇ ਬਾਰੇ ਮੇਂ ਗਲਤ ਧਾਰਨਾਓਂ ਕੇ ਕਾਰਨ ਪੇਸ਼ ਆ ਰਹੀ ਸਮਸ਼ਿਆਏਂ ਕਯਾ ਹੈਂ?

ਖੁਸ਼ੀ ਕੀ ਹੈ? ਖੁਸ਼ੀ ਨੂੰ ਪ੍ਰਾਪਤ ਕਰਨ ਦੇ ਬਾਰੇ ਵਿੱਚ ਗਲਤ ਧਾਰਨਾ ਕੀ ਹੈ? ਸੁਖ ਅਤੇ ਖੁਸ਼ਹਾਲੀ ਦੇ ਬਾਰੇ ਵਿੱਚ ਗਲਤ ਧਾਰਨਾਵਾਂ ਦੇ ਕਾਰਨ ਪੇਸ਼ ਆ ਰਹੀਆਂ ਸਮਸ਼ਿਆਵਾਂ ਕੀ ਹਨ?

11. Describe in brief the salient values in human relationships.

ਸਾਨਕੀਯ ਰਿਸ਼ਤੋਂ ਮੇਂ ਸੰਕਿਪਤ ਸੁਖ਼ਯ ਮੂਲ੍ਯੋਂ ਕਾ ਵਿਕਰਣ ਦੇਂ।

ਮਾਨਵੀ ਰਿਸ਼ਤਿਆਂ ਵਿੱਚ ਸਬੰਧਿਤ ਮੁੱਖ ਮੁੱਲਾਂ ਦਾ ਵਰਨਣ ਕਰੋ।

OR

What are the five dimensions of human endeavour in society?

ਸਮਾਜ ਮੇਂ ਸਾਨਕ ਪ੍ਰਯਾਸ ਕੇ ਪਾਂਚ ਆਯਾਸ ਕਯਾ ਹੈਂ?

ਸਮਾਜ ਵਿੱਚ ਮਨੁੱਖ ਕੋਸ਼ਿਸ਼ ਦੇ ਪੰਜ ਪਹਿਲੂ ਕੀ ਹਨ?

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Roll No.

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Total No. of Pages : 03

Total No. of Questions : 05

**B.Tech. (AI&DS)/(AI&ML)/(CE)/(CSE/DS) /(EE)/(ECE)/(EEE)(IT)/(ME)/(IOT
and Cyber Security Including Block Chain Technology) (Sem.-1,2)**

ENGLISH

Subject Code : BTHU-101-18

M.Code : 75349

Date of Examinaton : 03-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES:

1. All Questions Are COMPULSORY.

1. a) Use the following phrases in sentences: for good, in a short time, with patience, with a bad temper, on the desk.
b) **Correct the following :**
 - i. She have a beautiful dress.
 - ii. He don't have any siblings.
 - iii. I visits my grandmother every weekend.
 - iv. They doesn't like to watch movies.
 - v. She can sings very well.
2. Draft a business letter to the dealers of your company to send details of vehicles sold model wise in the last six months. Give reasons behind your request.
3. a) Draft a business email to the suppliers of the company to give additional discounts on the raw material being purchased from them.
b) Elaborate features of conclusion in writing.
4. Write an essay in about 500 words on "Increase in Population and Poverty" OR "Empowerment for Women".

5. Read the following passage carefully and answer the questions that follow :

In some ways we already do: every time we spend our cash we are making an active choice about the companies support and the practices we endorse. Today, when corporations can be more influential than entire states, where we put our pounds is where the power lies. The problem is/so it is difficult to confidently make an informed choice. Consider this: the retail manufacturing industry is the second most polluting industry on earth, second only to oil. According to Annie Leonard, an expert in overconsumption, only 1% of the materials used to produce our consumer goods are still in use six-months after sale. Somewhere, the value of craftsmanship and of provenance has been lost. Price and speed are trumping value. However, the tide is turning. Increasing awareness around these issues has led to a rise in what is known as conscious consumption, a movement of people who seek out ways to make positive decisions about what to buy and look for a solution to the negative impact consumerism is having on our world. This is a growing tribe: a third of UK consumers claim to be very concerned about issues regarding the origin of products. A study from YouGov and the Global Poverty Project revealed that 74% of those surveyed would pay an extra 5% for their clothes if there was a guarantee workers were being paid fairly and working in safe conditions. If you're thinking that 5% doesn't sound like a lot, consider the fact that the fashion industry could take a staggering 125 million people out of poverty by adding only 1% of its profits to workers' wages. Issues such as equal pay, environmentally conscious manufacturing processes, prevention of counterfeit goods, human trafficking, responsible farming practices and overproduction of goods are all at the forefront of consumers' minds when making these choices. In an increasingly open, digital world where authenticity is the buzzword of choice; businesses must keep up with growing demands for ethical behaviour and transparency in everything from employee rights and gender discrimination to the supply chain. In studying for my Phd, I researched product supply chain transparency in depth, looking at technologies to improve information about products and the global network of people and resources that fuel them. I believe technology is the key to dealing with the challenges created by consumerism. Open data, social networks and mobile tech can change the game. Groundbreaking technologies could enable transparency in supply chains, which is why this year I have opened on turning my findings into a social enterprise to empower businesses to take steps to being open.

1. Why businesses must keep up with the growing demands of ethical behavior and transparency?
2. Which statement(s) corroborate the statement made by the author that "the tide is turning"?
3. According to the author, how can we tackle the impact of consumerism?

4. **Make sentences to clarify the meaning of the following words :** endorse, staggering, empower.

5. Give a gist of the passage.

Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

**B.Tech.(AI & DS/ AI&ML/ Block Chain/
CE/CSE/CS/IOT/DS/CSD/EE/EEE/ECE/ETE/FT/IT/ME/Robotics & Artificial
Intelligence/Internet of Things and Cyber Security including Block Chain
Technology) (Sem.-1,2)**

ENGINEERING GRAPHICS & DESIGN

Subject Code : BTME101-21

M.Code : 93799

Date of Examination : 31-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Write short notes on :

- Explain the terms isometric drawing and isometric projection.
- Show by means of traces, a plane inclined to HP and perpendicular to VP.
- Draw projections of a line lying on HP and inclined to VP with the help of a suitable free hand drawing. Also, show traces.
- How will you represent Liquid and Wood on a drawing sheet?
- Name the methods to determine the true length and true inclinations of a straight line.
- What is the difference between plain scale and diagonal scale?
- What are the standard sizes of drawing sheets?
- Explain with the help of a simple sketch (i) size dimensions (ii) location dimensions.
- Write the following statement using single stroke capital vertical letters of 12 mm size :**

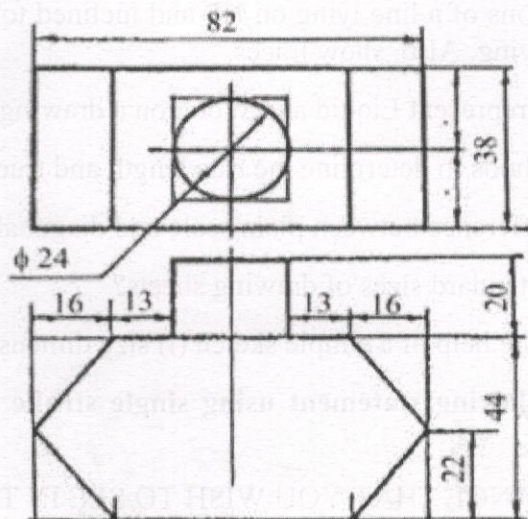
"BE THE CHANGE THAT YOU WISH TO SEE IN THE WORLD".
- Explain the following terms with a suitable freehand drawing: Apex, Slant Height, Base Rim and Generator.

SECTION - B

- On a plan, a line 22cm long represents a distance of 440m. Draw a Diagonal Scale to read up to single meter. Mark 287m on the scale.
- A point "N" is 68 mm behind VP and 79 mm below HP. Draw its projections and find out its shortest distance from the reference line.
- Plan and elevation of a line "AB" 75mm long, measure 65mm and 50 mm respectively. End A is in HP and 12mm from VP. Draw its projections and determine its inclinations to the reference planes when the line lies in first quadrant.
- A line "EF" is lying on profile plan. Its end "E" is 45mm in front of VP and 10mm above HP and end "F" is 10mm in front of VP and 50mm above HP. Draw its projections and determine the true length, traces and inclination with the reference planes.

SECTION - C

- A Pentagonal plane with a 30mm side has an edge on HP, the surface of the Plane is inclined at 45° to the HP and perpendicular to VP. Draw its Projections assuming the plane in first quadrant.
- A right regular Hexagonal Prism having a base with a 30 mm side and 75 mm long axis has an edge of its base on HP. Its axis is parallel to VP and inclined at 45° to HP. Draw its projections assuming the prism lying in first quadrant.
- A right regular pentagonal prism, edge of base 20mm and height 50 mm has a central circular hole of diameter 20 mm drilled centrally through it, along with its axis. Draw its isometric projection.
- Draw the isometric drawing with the following orthographic projections :**



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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AE/ME/CSE) (Sem.-1,2)

ELECTROMAGNETISM

Subject Code : BTPH-103-18

M.Code : 75357

Date of Examination : 31-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Answer the following :
 - a. Write Laplace's and Poisson's equation.
 - b. If $\vec{r} = 2x\hat{i} + 3y\hat{j} + z\hat{k}$, find the value of $\vec{\nabla} \cdot \vec{r}$
 - c. Define magnetic susceptibility.
 - d. State Bio-savart law.
 - e. Draw hysteresis loop and label it.
 - f. Define Poynting vector.
 - g. Is the displacement current something fictitious?
 - h. Write Continuity equation for current densities and explain different terms in it.
 - i. What is elliptical polarization?
 - j. What do you understand from normal incidence?

SECTION - B

2. Obtain the expression for electric potential due to a dipole.
3. Find the electric field due to charge in front of a dielectric slab.
4. Show that magnetic field can be expressed as curl of vector potential.
5. Distinguish between diamagnetic and paramagnetic materials. Explain the origin of magnetization in paramagnetic materials.

SECTION - C

6. Derive the differential form of Faraday's law of electromagnetic induction.
7. Solve Maxwell's equation for vacuum and non-conducting medium and evaluate the velocity of electromagnetic waves in vacuum.
8. Show that amplitude of the wave gets attenuated with distance inside the conducting medium.
9. Prove that a perfect conductor is a perfect reflector of electromagnetic waves.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech. (AI & ML/CSE/DS/AI&DS/IT/Internet of Things and Cyber Security
including Block Chain Technology) (Sem.-1,2)**

SEMI-CONDUCTOR PHYSICS

Subject Code : BTPH-104-18

M.Code : 75360

Date of Examination : 31-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Write briefly :
 - a. Define Bloch's theorem.
 - b. Distinguish between direct and indirect bandgaps.
 - c. In a solid, consider the energy level lying 0.01 eV above Fermi level. What is the probability of this level being occupied by an electron at 200 K?
 - d. What are Ohmic junctions?
 - e. Classify metals in Conductor, semiconductor and insulator on the basis of energy band.
 - f. Define population inversion.
 - g. What is Fermi's golden rule?
 - h. Explain Photovoltaic effect.
 - i. When a laser has 3 V applied to it, it draws 30 mA and produce 3 mW of optical power. What is the efficiency of laser?
 - j. What are the necessary conditions for applying Van der Pauw method?

SECTION - B

2. What are the special features of Classical free electron theory of metals? Derive an expression for the thermal conductivity of a metal.
3. What is Kronig-Penny model? Solve Schrödinger wave equation for periodic potential and explain the origin of energy bands in solids.
4. Obtain the expression for electron density in an intrinsic semiconductor. Estimate the fraction of electrons in conduction band at room temperature in Ge with band gap 0.50eV.
5. What is the need of extrinsic semiconductors? Discuss the effect of temperature on the Fermi level in extrinsic semiconductors.

SECTION - C

6. What is joint density of states? Derive the expression for joint density of states.
7. What are Einstein coefficients? Obtain the relation between Einstein coefficients and discuss its importance.
8. Explain any method to measure the wavelength of monochromatic light. Can the same method be used for measuring wavelength of white light?
9. (a) What is Four-point probe method? Explain the measurement of band gap using it.
(b) The resistivity of an intrinsic semiconductor is $5.5 \Omega \text{ m}$ at 30°C and $3.0 \Omega \text{ m}$ at 42°C . Find the band gap.

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Total No. of Questions : 09

ENGINEERING PHYSICS

M.Code : 93794

Date of Examination : 14-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

1. Write briefly :
- Calculate the minimum wavelength of Continuous X-rays emitted from an X-ray tube whose operating voltage is 40 kV.
 - Show that at 0 K, the probability to find electron in an energy level above the fermi level is Zero.
 - Why superconductors cannot carry current beyond a certain limit?
 - Distinguish between diamagnetic and paramagnetic materials.
 - Show that Divergence of Curl of vector is zero.
 - Distinguish between Stimulated emission and spontaneous emission.
 - Write a note on four level lasers.
 - What are Carbon Nanotubes (CNTs)?

- i. An electron has a speed of 400 m/s, correct upto 0.01%, with what minimum accuracy, can you locate the electron?
- j. Distinguish between splicers and couplers.

SECTION - B

2. What is Bragg's law? Explain the measurement of crystal spacing (d) using Bragg's spectrometer.
3. Distinguish between intrinsic and extrinsic semiconductors. Derive the expression for carrier concentration in n-type semiconductors.
4. What is Meissner effect? Explain it using London's equation.
5.
 - a. Write the Maxwell's equations and discuss the physical significance of each equation.
 - b. Define Poynting vector ($\vec{P}$). Show that $\vec{P} = < \vec{E} \times \vec{H} >$, where symbols have their usual meanings.

SECTION - C

6. Explain the construction and working of Ruby laser with the help of energy level diagram. Explain why it is pulsed laser?
7. What are the various kinds of losses a light suffers while propagating through a fibre? Calculate the refractive index of core and clad of fibre where Numerical aperture is 0.40 and $\Delta = 0.020$.
8. Solve time independent Schrodinger wave equation for particle in a box and show that energy of particle is quantized.
9. Explain the synthesis of nanomaterials using sol-gel techniques. Why it is called bottom to top approach?

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CE/AI&ML/AI&DS/CSE/EE/ECE/EEE/IT/ME/Computer Engineering/IOT and Cyber Security including Block chain Technology)
(Sem.-1,2)

PROGRAMMING FOR PROBLEM SOLVING

Subject Code : BTPS-101-18

M.Code : 75346

Date of Examination : 05-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- INSTRUCTIONS TO CANDIDATES :**
1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
 2. SECTION - B & C have **FOUR** questions each.
 3. Attempt any **FIVE** questions from SECTION B & C carrying **EIGHT** marks each.
 4. Select at least **TWO** questions from SECTION - B & C.

SECTION - A

1. **Write briefly :**
 - a) Explain the concept of an algorithm with an example.
 - b) Define syntax and logical errors with examples.
 - c) Describe a conditional statement in programming.
 - d) Describe the difference between 1-D and 2-D arrays.
 - e) Explain the concept of algorithm complexity with an example.
 - f) Explain parameter passing in functions.
 - g) What are the advantages of using recursion?
 - h) Explain the difference between a structure and an array.
 - i) Describe the use of pointers in programming and discuss their advantages and disadvantages.
 - j) Explain the difference between reading and writing modes in file handling.

SECTION - B

2. Describe the different components of a computer system and their functions.
3. Explain the role of the operating system and compilers in program execution.
4. Explain how conditional branching and looping structures are used together in Programming, with examples.
5. Discuss the concept of an array of structures and provide an example.

SECTION - C

6. Write a pseudocode to calculate the sum of the first 10 natural numbers.
7. Create a program to add two matrices represented as 2-D arrays.
8. Explain the process of linear and binary search algorithms with examples.
9. Explain self-referential structures and how pointers are used in linked lists.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

Total No. of Questions : 09
B.Tech. (AI&DS / AI&ML / Block Chain / CE / CSE / CS / DS / IOT / CSD /
EEE / EE / ECE / ETE / FT / IT / ME / Robotics & Artificial Intelligence /
Internet of Things and Cyber Security including Block Chain
Technology) (Sem - 1 2)

BASIC ELECTRICAL ENGINEERING

Subject Code : BTEE101-18

M.Code : 93797

Date of Examination : 05-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- INSTRUCTIONS TO CANDIDATES :**
1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
 2. SECTION - B & C. have **FOUR** questions each.
 3. Attempt any **FIVE** questions from **SECTION B & C** carrying **EIGHT** marks each.
 4. Select atleast **TWO** questions from **SECTION - B & C**.

SECTION-A

1. Write short notes on :

- What is the function of a contactor?
- What is an apparent power? Draw the power triangle.
- What are the demerits of low power factor to an electric AC system?
- What are dependent voltage and current sources?
- Draw the electric circuit schematic of a step down auto-transformer.
- Distinguish between the active and passive elements.
- Explain the working principle of a single-phase induction motor.
- Enlist the types of batteries in electric systems.
- Draw and explain in brief, the BH curve for a typical magnetic material.
- Explain the three-phase balanced circuits.

SECTION-B

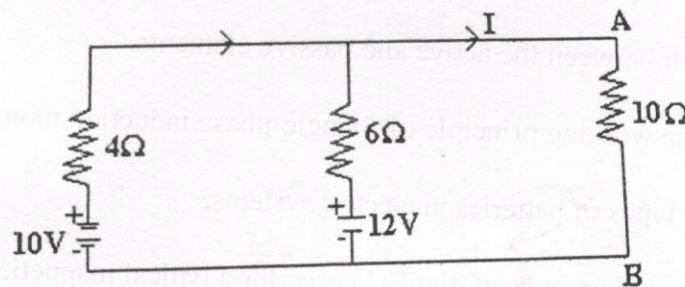
2. Draw and explain the electric circuit schematic of an earth leakage circuit breaker.
3. State and prove the Superposition theorem. Give example.
4. Prove that the emf in DC machines is directly proportional to flux per pole and speed. Derive it.
5. A capacitor has a capacitance of $30\ \mu\text{F}$. Find its capacitive reactance for frequencies of 25 Hz and 50 Hz. Find in each case the current, if the supply voltage is 440 V.

SECTION-C

6. A choke coil is connected in series with a $200\ \mu\text{F}$ capacitor. With a constant supply voltage of 250 V, it is found that the circuit takes its maximum current of 50 A, when the supply frequency is 100 Hz.

Determine :

- a) Resistance and inductance of the choke coil.
 - b) Voltage across the capacitor.
 - c) Q-factor of the circuit.
7. What is the purpose of earthing? Explain the procedure for implementing any one type of earthing in a domestic system.
 8. Calculate the value of voltage regulation at 0.8 pf lagging for a transformer with resistance drop 2% and reactance drop of 4% of the voltage. Hence, explain the significance of the voltage regulation. (6, 2)
 9. Determine the current I in the network by using Thevenin's theorem. Use figure below.



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Roll No.

Total No. of Pages : 01

Total No. of Questions : 09

B.Tech. (AI&DS/AI&ML/Blockchain/CE/CSE/Cyber Security/IOT/CS&D/EEE/ECE/DS/EE/ECE(Industry Integrated)/ETE/ECS/FT/IT/ME/Robotics & AI/CSE (Internet of Things and Cyber Security including block Chain Technology)) (Sem.-2)

ENGINEERING MATHEMATICS-II

Subject Code : BTAM201-23

M.Code : 93811

Date of Examination : 06-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

SECTION - A

l. Write a short notes on :

- a) Determine whether the system of equations : $x - 3z = -1$ and $2x - z = 3$ is consistent or not? Justify.

b) Find the column rank of the matrix $A = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 4 & 3 \\ 3 & 3 & 6 \end{pmatrix}$.

- c) State Rank-Nullity theorem.
- d) If λ is an eigenvalue of the matrix A , then prove that $\alpha\lambda$ is an eigenvalue of αA , where α is a scalar.
- e) Let $T: V \rightarrow V$ be a Linear Transformation. Show that $T(O) = O$, where O is the zero element of vector space V .
- f) Write down the ordinary differential equation for simple population decay model.
- g) Find the particular integral of $(D^3 + 1)y = \cos(2x - 1)$.
- h) Find the differential equation of all ellipses centered at the origin and foci on x-axis.
- i) Construct the partial differential equation of $z = a(x + y) + b(x - y)$ by eliminating the arbitrary constants.

j) Find the solution of the partial differential equation $(D^4 - 2D^2D'^2 + D'^4)z = 0$.

SECTION - B

2. Using Gauss Elimination method, solve the following system of linear equations :

$$x + 3y - 2z = 0, \quad 2x - y + 4z = 0, \quad x - 11y + 14z = 0.$$

3. Determine the all values of k such that the rank of the matrix A is 3, where

$$A = \begin{bmatrix} 1 & 1 & -1 & 0 \\ 4 & 4 & -3 & 1 \\ k & 2 & 2 & 2 \\ 9 & 9 & k & 3 \end{bmatrix}.$$

4. Diagonalize the matrix $\begin{pmatrix} 0 & 2 & 1 \\ 2 & 0 & 3 \\ 1 & -3 & 0 \end{pmatrix}$.

5. Find a Linear transformation $T : \mathbb{R}^4 \rightarrow \mathbb{R}^3$ whose null space is generated by $(1, 2, 3, 4)$ and $(0, 1, 1, 1)$.

SECTION - C

6. If $\log \left(\frac{dy}{dx} \right) = (x + y)$ and $y(1) = 1$, then find $y(-1)$.

7. Solve $\frac{d^2y}{dx^2} + a^2y = \tan ax$, using the method of variation of parameters.

8. Find the general solution of the partial differential equation $(y + z)p + (z + x)q = x + y$.

9. Solve $(p^2 + q^2)x = pz$ using Charpit's method.

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Total No. of Questions : 09

MATHEMATICS-II

M.Code : 91958

Time : 3 Hrs.

Max. Marks : 60

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select at least TWO questions from SECTION - B & C.

1. Write a short notes on :

- Eliminate the constants to obtain the differential equation for $y = ae^x + be^{-x} + c$.
- Show that the differential equation $(2x \sin 3y \, dx + 3x^2 \cos 3y \, dy) = 0$ is exact.
- Solve $y = px + \sin^{-1} p$, where $p = \frac{dy}{dx}$.
- Solve $(y \log y) \, dx + (x - \log y) \, dy = 0$.
- From partial differential equation for $z = ax + by + a^2 b^2$.
- Solve $xy s = 1$, where $s = \frac{\partial^2 z}{\partial x \partial y}$.
- What are the limitations of Newton Raphson method.
- What is the geometrical interpretation of Regula – Falsi method.
- Write down the formulas for Runge – Kutta 4th order method.
- Write down the equation of two-dimensional Poisson equation.

SECTION - B

2. a) Solve $((\cos x \tan y + \cos(x+y)) dx + (\sin x \sec^2 y + \cos(z+y)) dy = 0$.
b) Solve $(x^2y^2 + xy + 1) y dx + (x^2y^2 - xy + 1) x dy = 0$.
3. a) Solve $y = 2px + y^2p^3$.
b) Solve $x \frac{dy}{dx} + y = x^3y^6$.
4. a) Solve $p + q = 0$, where $p = \frac{\partial z}{\partial x}$, $q = \frac{\partial z}{\partial y}$.
b) Solve $2r - 5s + 2t = 0$, where $r = \frac{\partial^2 z}{\partial x^2}$, $s = \frac{\partial^2 z}{\partial x \partial y}$, $t = \frac{\partial^2 z}{\partial y^2}$.
5. Solve $xp + yq = 0$ by method of separation of variables, where $p = \frac{\partial z}{\partial x}$, $q = \frac{\partial z}{\partial y}$.

SECTION - C

6. Find a real root of the equation $x^4 + 2x^2 - 16x + 5 = 0$ correct to three decimal places using Bisection method.
7. Use Simpson's $1/3^{\text{rd}}$ rule to find an approximate value of $\int_3^5 \frac{4}{2+x^2} dx$ taking 8 intervals.
8. Use Taylor's series method to obtain approximate value of $y(0.2)$ for the differential equation $\frac{dy}{dx} = 2y + 3e^x$, $y(0) = 0$, correct the three decimal places.
9. Solve the heat equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the boundary conditions $u(x, 0) = 0 = u(0, t)$ and $u(1, t) = t$. Carry out calculation for first level only by Crank-Nicolson method. (Take $h = 1/2$ and $k = 1/8$).

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Total No. of Questions : 09

Total No. of Pages : 02

B.Tech. (AE/CSE/ME) (Sem-2)

MATHEMATICS-II

Subject Code : BTAM-203-18

M.Code : 91959

Date of Examination : 20-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION - A

1. Solve :

- a) By eliminating arbitrary constants a and b , form a differential equation for the family of curves $y = e^{2x}(a + bx)$.
- b) Find the general solution of $\frac{dy}{dx} = \frac{y(x^2 - 1)}{x(y^2 - 1)}$.
- c) For what value of a and b , the differential equation $(y + x^3) dx + (ax + by^3) dy = 0$ is exact.
- d) Obtain general solution of differential equation $y = xy' - (y')^3$, where $y' = \frac{dy}{dx}$.
- e) Solve $4x^2 \frac{d^2y}{dx^2} + y = 0$.
- f) Evaluate $\lim_{z \rightarrow \infty} \frac{iz^3 + iz - 1}{(2z + 3i)(z - i)^2}$.
- g) Find p such that the function $f(z) = r^2 \cos 2\theta + ir^2 \sin p\theta$ is analytic.
- h) What do you mean by conformal mapping?
- i) Expand the function $f(z) = \frac{\sin z}{z - \pi}$ about $z = \pi$.
- j) Evaluate $\int_0^{1+i} (x - y + iz^2) dz$ along the straight line $z = 0$ to $z = 1 + i$.

SECTION - B

2. a) Solve $\sec^2 x \tan y \, dx + \sec^2 y \tan x \, dy = 0$
b) Solve $(x^2 - 4xy - 2y^2) \, dx + (y^2 - 4xy - 2x^2) \, dy = 0$
3. a) Solve $(x^4 e^x - 2mxy^2) \, dx + 2mx^2 y \, dy = 0$
b) Solve $p - \frac{1}{p} = \frac{x}{y} - \frac{y}{x}$, where $p = \frac{dy}{dx}$.
4. Find the general solution of $y'' + 16y = 32\sec 2x$ using method of variation of parameters, here $y'' = \frac{d^2 y}{dx^2}$.
5. Solve $\frac{d^2 y}{dx^2} + x \frac{dy}{dx} + (x^2 + 2)y = 0$ in power series of x .

SECTION - C

6. Use residue theorem to evaluate $\int_0^{2\pi} \frac{d\theta}{2 + \cos \theta}$.
7. Expand $\frac{1}{(z^2 + 1)(z^2 + 2)}$ as a Laurent series valid for
a) $1 < |z| < \sqrt{2}$
b) $|z| > 2$
8. Show that the function $u = e^{-2xy} \sin(x^2 - y^2)$ is harmonic. Find the harmonic Conjugate Function v and express $u + iv$ as analytic function of z .
9. Determine the analytic function whose real part is $e^{2x}(x \cos 2y - y \sin 2y)$.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(AI & ML/DS/CSE/IT/Internet of Things and Cyber Security
including Block Chain Technology) (Sem.-02)**

MATHEMATICS-II

Subject Code : BTAM204-18

M.Code : 91960

Date of Examination : 20-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION - B & C. have **FOUR** questions each.
3. Attempt any **FIVE** questions from SECTION B & C carrying **EIGHT** marks each.
4. Select at least **TWO** questions from SECTION - B & C.

SECTION - A

1. Write short notes on :
- A cyclist pedals from his house to his college at a speed of 10 kmph. Find the average speed.
 - Find the variance of first n natural numbers.
 - Surjit and Sachdev appeared for an interview. The probability of their selection is $\frac{1}{3}$ and $\frac{1}{6}$, respectively. Find the probability that only one of them selected.
 - State any two properties of Binomial distribution.
 - Bring out the fallacy, if any, in the following statement :**
"The mean of a Poisson distribution is 5 while its standard deviation is 4."
 - What is the relation between Correlation and Regression Coefficients?
 - What is the Objective of Sampling?
 - State any two applications of t-test.
 - Define F-Test (Variance Ratio Test).
 - Define Chi-square (χ^2) test.

SECTION - B

2. Average scores of three batsman A, B and C are 40, 45, 55 respectively and their standard deviation are 9, 11, and 15, respectively. Which batsman is more consistent?
3. Calculate Karl Pearson's coefficient of skewness from the following data :

Profit (In Lakhs) below	20	40	60	80	100
No. of companies	8	20	50	64	70

4. Calculate the coefficient of correlation between the values X and Y given below :

X	79	89	97	69	59	79	68	61
Y	125	137	156	112	107	136	123	108

5. The data given below shows the age of husbands and age of wives. Estimate the most likely age of husband when wife's age is 16 years :

Age of husbands (in years)	36	23	27	28	28	29	30	31	33	35
Age of wives (in years)	29	18	20	22	27	21	29	27	29	28

SECTION - C

6. In a distribution, exactly normal, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution?
7. Fit the curve $y = a + bx^2$ to the data
- | | | | | | |
|---|----|----|----|----|----|
| X | 10 | 20 | 30 | 40 | 50 |
| Y | 8 | 10 | 15 | 21 | 30 |
8. A dice is thrown 9,000 times of 3 or 4 is observed 3,240 times. Show that the dice cannot be regarded as an unbiased one and find the limits between which the probability of a throw of 3 or 4 lies.
9. A sample of 18 items has a mean 24 units and standard deviation 3 units. Test the hypothesis that it is a random sample from a normal population with mean 27 units.

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Roll No.

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech. (EE/ME) (Sem. – 2)

ENGINEERING MATHEMATICS-II

Subject Code: BTAM-102

M Code: 54092

Date of Examination : 23-05-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each, carrying EIGHT marks each.
3. Attempt any FIVE questions from SECTION B & C, selecting atleast TWO questions from each of these SECTIONS B & C.

SECTION - A

1. Answer the following :

- What do you mean by exact differential equation?
- Write any two applications of ordinary differential equation.
- Define rank of a non zero matrix with example.
- Define unitary matrix and Hermitian matrix.
- Calculate real and imaginary part of e^{-2z} .
- Give the statement of Gauss test.
- What do you mean by Simple Harmonic Motion?
- Evaluate : $\frac{(\cos \theta + i \sin \theta)^3}{(\sin \theta + i \cos \theta)^4}$
- Write the difference between conditional convergence and absolute convergence.
- Compute $\cos 3\pi i$ in the form $u + iv$.

SECTION - B

2. Verify Cayley Hamilton theorem for the matrix $\begin{bmatrix} 0 & 0 & 1 \\ 1 & 2 & 0 \\ 2 & -1 & 0 \end{bmatrix}$ hence find A^{-1} .
3. Solve the Differential Equation : $(D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x$.
4. Reduce the matrix $\begin{bmatrix} 2 & 2 & 2 \\ 1 & 2 & 1 \\ 3 & 4 & 3 \end{bmatrix}$ to the normal form and hence find its rank.
5. Define circular, inverse circular, hyperbolic and inverse hyperbolic functions of complex variables.

SECTION - C

6. Discuss the convergence or divergence of the series $\sum \frac{n!}{(n+1)^n} x^n, x > 0$.
7. Solve using the method of variation of parameters : $\frac{d^2 y}{dx^2} + 4y = 4 \tan 2x$
8. Solve the simultaneous equation : $\frac{dx}{dt} + 4x + 3y = t, \frac{dy}{dt} + 2x + 5y = e^t$
9. Find the current $I(t)$ (a general solution) in an RLC circuit connected in series with $R = 11$ ohms, $L = 0.1$ H, $C = 0.01$ F and voltage source $E(t) = 100 \sin 400t$. The values of initial current and charge are zero. Assume the missing data if any.

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Total No. of Pages :03

Total No. of Questions : 09

Total No. of Questions : 09
B.Tech.(AI&ML/AI&DS/BlockChain/CE/CSE/IOT/DS/CS/CSD)/EE/EEE/ECE/ETE/IT/ME/ (Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technology) (Sem.-2)
ENGLISH

ENGLISH

Subject Code : BTHU101-18

M.Code : 93806

Date of Examination : 27-05-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- INSTRUCTIONS TO CANDIDATES :**
1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
 2. SECTION - B & C have **FOUR** questions each.
 3. Attempt any **FIVE** questions from SECTION B & C carrying **EIGHT** marks each.
 4. Select atleast **TWO** questions from SECTION - B & C.

SECTION-A

1. Write briefly :
- Give synonym and antonym of Angry.
 - Write full form of a.m. and https.
 - She is happy..... her victory, (fill in preposition).
 - It's important to place modifiers close to words they modify. (Fill in articles)
 - I will call you when I arrive. (Identify clause)
 - Create antonyms of any two words using prefix "dis-".
 - Change any two words into adjective using suffix "-ful"
 - have tried, but few have succeeded. (use pronoun)
 - She behave in a very modest manner. (Identify the error and correct it)
 - I saw the cat running down the street with a broken leg. (Place the modifier at correct place)

SECTION - B

2. What is the importance of maintaining a consistent tone throughout a piece of writing?
3. How can you ensure your writing is clear and concise?
4. Write an introduction to a paper on "Use of Technology in Education System".
5. What are the standard formatting guidelines for academic papers?

SECTION-C

6. Write a letter to your client informing him/her about the delay in delivery of assignment to them.
7. Write an essay on any of the following :

The Importance of Mental Health Awareness, Cultural Diversity and Its Influence on Society or The Influence of Art and Literature on Society.

8. Make a precise of the following and give a suitable title :

In today's fast-paced world, the significance of effective time management cannot be overstated. Individuals and organizations alike face the constant challenge of juggling multiple tasks and responsibilities. Proper time management enables people to prioritize their duties, set achievable goals, and allocate their time efficiently. By employing techniques such as the Eisenhower Matrix, which categorizes tasks based on urgency and importance, individuals can focus on what truly matters and avoid becoming overwhelmed. Additionally, establishing a daily routine fosters discipline and helps minimize distractions. The benefits of mastering time management extend beyond productivity; it also reduces stress levels and enhances overall well-being. Those who manage their time effectively often report feeling more in control of their lives and are better equipped to handle unexpected challenges. Furthermore, in professional settings, efficient time management can lead to improved team collaboration and project outcomes, as deadlines are met and expectations are exceeded. In conclusion, cultivating strong time management skills is essential for achieving personal and professional success. It empowers individuals to make informed decisions about how to spend their time, leading to a more balanced and fulfilling life.

9. Read the following paragraph and answer the questions that follow :

Climate change is one of the most pressing issues facing humanity today. It refers to the long-term alteration of temperature and typical weather patterns in a place. While natural factors contribute to climate change, human activities, such as burning fossil fuels and deforestation, are the primary drivers of the current rapid changes. The effects of climate change are widespread and include rising sea levels, more frequent extreme weather events and disruptions to ecosystems. Addressing climate change requires collective action on a global scale, including transitioning to renewable energy sources, enhancing energy efficiency, and implementing sustainable practices in agriculture and industry. Public awareness and individual actions also play crucial roles in mitigating climate change effects. Governments, businesses, and individuals must work together to create innovative solutions and policies that can lead to a more sustainable future.

Comprehension Questions :

- a) What is the primary cause of the current rapid changes in climate, according to the paragraph?
- b) List two effects of climate change mentioned in the text.
- c) What actions are suggested to address climate change?
- d) How does the paragraph emphasize the importance of collective action?
- e) What role do public awareness and individual actions play in combating climate change?

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