

I.B. Tech I Semester Regular/Supplementary Examinations, February - 2023
MATHEMATICS-I
(Common to all Branches)

Max. Marks: 70

Time: 3 hours

*Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks*

UNIT - I

1. a) Examine the convergence of $\frac{2^{n+1}-2}{3^{n+1}+1} x^n$ for $x > 0$. [7M]
b) Find the Maclaurin series expansion of $f(x) = \cosh x$. [7M]
- (OR)
2. a) Show that $\log(1+x) = \frac{x}{(1+0x)}$ where $0 < 0 < 1$, and hence deduce that $\frac{x}{1-x} < \ln(1+x) < x$ if $x > 0$. [7M]
b) Examine the convergence of $\sum_{n=0}^{\infty} (-1)^n (n+1)x^n$ with $x > \frac{1}{2}$. [7M]

UNIT - II

3. a) Solve $3y' + xy = xy^{-2}$. [7M]
b) If a substance cools from 370k to 330k in 10 minutes, when the temperature of the surrounding air is 290k, find the temperature of the substance after 40 minutes. [7M]
- (OR)
4. a) Show that the family of parabolas $y^2 = 4cx + 4c^2$ is "self-orthogonal". (Where c is a parameter). [7M]
b) Solve $(2y^2 + 4x^2y)dx + (4xy + 3x^3)dy = 0$. [7M]

UNIT - III

5. a) Solve $(D^3 - 2D + 4)y = x^4 + 3x^2 - 5x + 2$. [7M]
b) Determine the current $I(t)$ in an RLC circuit with emf $E(t) = E_0 \cos \omega t$. [7M]
- (OR)

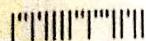
6. a) Solve $(D^2 + 1)y = x \cos 2x$ by the method of variation of parameters. [7M]
b) Solve $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 5y = x^2 \sin(\log x)$. [7M]

UNIT - IV

7. a) If $w = x^2y + y^2z + z^2x$, then prove that $w_x + w_y + w_z = (x + y + z)^2$. [7M]
b) Investigate the maxima and minima, if any, of the function $f(x, y) = x^4 + y^4 - x^2 - y^2 + 1$. [7M]

(OR)

8. a) Determine whether the following functions are functionally dependent or not? [7M]
Find a functional relation between them in case they are functionally dependent.
 $u = \frac{x+y}{x-y}, v = \frac{xy}{(x-y)^2}$
- b) Expand $f(x, y) = e^y \ln(1+x)$ in powers of x and y . [7M]



Code No: R201101

R20

SET - 1

UNIT - V

9. a) Evaluate $\iint_D (1 + x + y) dx dy$ where D is the region bounded by $y = x$, $x = \sqrt{y}$, $y=1$ and $y=0$.
b) Change the order of integration and then evaluate $\int_0^1 \int_{x^2}^{2-x} xy dy dx$.

(OR)

- 10 a) Evaluate $\int_0^2 \int_1^z \int_0^{yz} xyz dx dy dz$.
b) Evaluate $\int_0^{2a} \int_0^{\sqrt{2a-x^2}} dy dx$ by changing into polar coordinates.

2 of 2

Code No: R201101

R20

SET - 2

I.B. Tech I Semester Regular/Supplementary Examinations, February - 2023

MATHEMATICS-I

(Common to All Branches)

Max. Marks: 70

Time: 3 hours

Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks

UNIT - I

[7M]

1. a) Examine the convergence of $\left[\frac{n}{n^2+1} x^{2n} \right]^{\frac{1}{2}}$.
 b) State Maclaurin's theorem with Lagrange's form of remainder for $f(x) = \cos x$. [7M]

(OR)

2. a) Using Lagrange's Mean Value theorem prove that $\frac{\pi}{3} - \frac{1}{5\sqrt{3}} > \cos^{-1} \frac{3}{5} > \frac{\pi}{3} - \frac{1}{8}$. [7M]
 b) Examine the convergence of $\sum_{n=2}^{\infty} \frac{(-1)^{n-1} x^n}{n(n-1)}$ with $0 < x < 1$.

UNIT - II

[7M]

3. a) Solve $2xyy' = y^2 - 2x^3$.
 b) Water at temperature 100°C cools in 10 min to 80°C in a room of temperature 25°C .
 (i) Find the temperature of water after 20 min.
 (ii) When will the temperature be 40°C .

(OR)

4. a) Show that the family of confocal conics $\frac{x^2}{a^2+c} + \frac{y^2}{b^2+c} = 1$ is "self-orthogonal".
 Here a and b are given constants.
 b) Solve $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$. [7M]

UNIT - III

[7M]

5. a) Solve $(D^4 + D^3 + D^2)y = 5x^2 + \sin 2x + 4e^{-3x}$
 b) Determine the current $I(t)$ in an RLC circuit with $emf E(t) = E_0 \sin \omega t$. [7M]

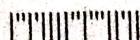
(OR)

6. a) Solve $(D^2 + 4)y = 4\sec 2x$ by the method of variation of parameters.
 b) Solve $x^3y''' + 2x^2y'' = x + \sin(\ln x)$. [7M]

UNIT - IV

7. a) Prove that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z} \right)^2 u = \frac{-9}{(x+y+z)^2}$ if $u = \ln(x^3 + y^3 + z^3 - 3xyz)$.
 b) Investigate the maxima and minima, if any, of the function $f(x, y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$. [7M]

1 of 2



(OR)

8. a) Determine whether the following functions are functionally dependent or not?
 Find a functional relation between them in case they are functionally dependent.
 $u = \frac{x-y}{x+a}, v = \frac{x+a}{y+a}$ where a is constant.
- b) Find Taylor's expansion of $f(x, y) = \cot^{-1}xy$ in powers of $(x + 0.5)$ and $(y - 2)$ up to second degree terms.

UNIT - V

9. a) Evaluate $\iint_D (x^2 + y^2) dx dy$ where D is the region bounded by $y = x, y^2 = x$ and $x=1$ in the first quadrant.
- b) Change the order of integration and then evaluate $\int_0^2 \int_{y^3}^{4\sqrt{2y}} y^2 dx dy$.
- (OR)
- 10 a) Evaluate $\int_0^a \int_0^x \int_0^{y+x} e^{x+y+z} dz dy dx$.
- b) Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} (x^2 + y^2) dx dy$ by changing into polar coordinates.

2 of 2

I.B. Tech I Semester Regular/Supplementary Examinations, February - 2023

MATHEMATICS-I

(Common to All Branches)

Max. Marks: 70

Time: 3 hours

*Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks*

UNIT - I

1. a) Examine the convergence of $\frac{1 \cdot 3 \cdot 5 \dots (2n-1)}{2 \cdot 4 \cdot 6 \dots 2n} x^{n-1}$ with $x > 0$. [7M]
 b) Verify Taylor's theorem for $f(x) = x^3 - 3x^2 + 2x$ in $[0, \frac{1}{2}]$ with Lagrange's remainder up to 2 terms.

(OR)

2. a) Show that $0 < \sin b - \sin a < b - a$ if $0 < a < b < \frac{\pi}{2}$. [7M]
 b) Examine the convergence of $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{(x+n)}$. [7M]

UNIT - II

3. a) Solve $(xy^5 + y)dx - dy = 0$. [7M]
 b) Water at temperature 10^0C takes 5 min to warm up to 20^0C in a room at temperature 40^0C . Find the temperature after 20 min and after $\frac{1}{2}$ hr.

(OR)

4. a) Show that the family of parabolas $y^2 = 2cx + c^2$ is "self-orthogonal". (where c is a parameter). [7M]
 b) Solve $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$. [7M]

UNIT - III

5. a) Solve $(D^4 + 2D^3 - 3D^2)y = 5x^2 + 7e^{2x} + 4\cos x$. [7M]
 b) A circuit consists of inductance of 0.05 henrys, a resistance of 5 ohms and a condenser of capacitance 4×10^{-4} farad. If $Q = I = 0$ when $t = 0$, find $Q(t)$ and $I(t)$ when there is a constant emf of 110 volts.

(OR)

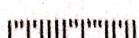
6. a) Solve $(D^2 + a^2)y = x \cos ax$ by the method of variation of parameters. [7M]
 b) Solve $x^2 y'' + 5xy' + 4y = x^2 + 16(\ln x)^2$. [7M]

UNIT - IV

7. a) Show that $yz_x + xz_y = x^2 - y^2$ if $e^{\frac{z}{(x^2-y^2)}} = (x - y)$. [7M]
 b) If the total surface area of a closed rectangular box is 108 sq. cm, find the dimensions of the box having maximum volume. [7M]

(OR)

8. a) If $x = e^u \sec v, y = e^u \cos v$, find $J = \frac{\partial(x, y)}{\partial(u, v)}$ and $J' = \frac{\partial(u, v)}{\partial(x, y)}$. Also show that $JJ' = 1$. [7M]
 b) Expand $\cos x \cos y$ in powers of x and y up to third degree terms. [7M]



R20

SET .3

Code No: **R201101**

UNIT - V

9. a) Evaluate $\iint_D xy \, dx \, dy$ where D is the domain bounded by the parabola $x^2 = 4ay$, the ordinates $x=a$ and x -axis.
b) Change the order of integration and then evaluate $\int_0^a \int_{y^2}^{2a-y} xy \, dx \, dy$.

(OR)

10. a) Evaluate $\int_0^{\frac{\pi}{2}} \int_x^{\frac{\pi}{2}} \int_0^{xy} \cos \frac{z}{x} \, dz \, dy \, dx$.
b) Evaluate $\int_{-a}^a \int_0^{\sqrt{a^2-x^2}} xy \, dx \, dy$ by changing into polar coordinates.

2 of 2

UNIT - V

9. a) Evaluate $\iint_D xy \, dx \, dy$ where D is the domain bounded by the parabola $x^2 = 4ay$, the ordinates $x=a$ and x -axis.

b) Change the order of integration and then evaluate $\int_0^a \int_{y^2/a}^{2a-y} xy \, dx \, dy$.

(OR)

10. a) Evaluate $\int_0^{\frac{\pi}{2}} \int_x^{\frac{\pi}{2}} \int_0^{xy} \cos \frac{z}{x} \, dz \, dy \, dx$.

b) Evaluate $\int_{-a}^a \int_0^{\sqrt{a^2-x^2}} xy \, dx \, dy$ by changing into polar coordinates.

2 of 2

I B. Tech I Semester Regular/Supplementary Examinations, February - 2023
MATHEMATICS-I
(Common to All Branches)

Time: 3 hours

Max. Marks: 70

*Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks*

UNIT - I

1. a) Examine the convergence of $(\sqrt{n^2 + 1} - n)x^{2n}$. [7M]
b) Find the Maclaurin's series expansion of $f(x) = \sinhx$. [7M]

(OR)

2. a) If $0 \leq a < b < \frac{\pi}{2}$ then show that $0 < \cos a - \cos b < b - a$. [7M]
b) Examine the convergence of $\sum_{n=0}^{\infty} \frac{(-1)^n}{1+n^2}$. [7M]

UNIT - II

3. a) Solve $y' - \cot y + x \cot y = 0$. [7M]
b) A body is heated to 110^0C and placed in air at 10^0C . After 1 hour its temperature is 60^0C . How much additional time is required for it to cool to 30^0C ? [7M]

(OR)

4. a) Show that the family of confocal conics $\frac{x^2}{a} + \frac{y^2}{a-b} = 1$ is "self-orthogonal". Here a is an arbitrary constant. [7M]
b) Solve $y(xy + 2x^2y^2)dx + x(xy - x^2y^2)dy = 0$. [7M]

UNIT - III

5. a) Solve $(D^4 + 2D^3 - 3D^2)y = x^2 + 3e^{2x} + 4\sin x$. [7M]
b) A circuit consists of an inductance of 0.05 henrys, a resistance of 5 ohms and a condenser of capacitance 4×10^{-4} farad. If $Q = I = 0$ when $t = 0$, find $Q(t)$ and $I(t)$ when there is an alternating emf $200 \cos 100t$. [7M]

(OR)

6. a) Solve $(D^2 + 1)y = \log \cos x$ by the method of variation of parameters. [7M]
b) Solve $x^3y''' - 8x^2y'' + 28xy' - 40y = -\frac{9}{x}$. [7M]

UNIT - IV

7. a) If $u = (x^2 + y^2 + z^2)^{\frac{1}{2}}$ then show that $(u_x)^2 + (u_y)^2 + (u_z)^2 = u^4$. [7M]
b) An aquarium with rectangular sides and bottom (and no top) is to hold 32 liters. [7M]
Find its dimensions so that it will use the least amount of material.

(OR)

8. a) Determine whether the following functions are functionally dependent or not? Find a functional relation between them in case they are functionally dependent.

$$u = \frac{x}{y}, v = \frac{x+y}{x-y}$$

- b) Obtain the expansion of e^{xy} in powers of $(x-1)$ and $(y-1)$.

UNIT - V

9. a) Evaluate $\iint_D x^3 y dx dy$ where D is the region enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ in the first quadrant.

- b) Change the order of integration and then evaluate $\int_0^1 \int_{y^2}^{y^{1/3}} xy dx dy$.

10. a) Evaluate $\int_0^1 \int_0^{1-x} \int_0^{1-x-y} \frac{dx dy dz}{(x+y+z+1)^3}$.

- b) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$ by changing into polar coordinates.

2 of 2

1 B. Tech I Semester Regular/Supplementary Examinations, February - 2023
COMMUNICATIVE ENGLISH
 (Common to All Branches)

Time: 3 hours

Max. Marks: 70

*Answer any FIVE Questions ONE Question from Each Unit
 All Questions Carry Equal Marks*

UNIT – I

1. a) How do you justify the title "A Drawer full of Happiness"? [7M]
- b) Write a paragraph on 'Digital India Movement' [7M]

(OR)

2. a) What is the main conflict in Premchand's "Deliverance"? [7M]
- b) Punctuate the following passage [7M]

We know Rabindranath Tagore as a poet and a laureate but he had many more titles under his name he was also a philosopher a writer a dramatist a composer a painter a novelist and an educationist he discovered the poet in him at the age of eight and that marked the beginning of the making of one of the greatest poets India has ever known

UNIT – II

3. a) What does Nehru believe to be the best way to determine what is right and wrong, and what is worth learning? [7M]
- b) Give Synonyms of the following:
 i) Conceptualize ii) Stimulate iii) Clarify iv) Streamline

Give Antonyms of the following:

- i) Vitalize ii) Counsel iii) Install

(OR)

4. a) Critically appreciate the poem "Bosom Friend" depicting the dynamics of caste. [7M]
- b) Fill in the blanks with suitable Prepositions [7M]
 - i) Rahuman was born in Chennai _____ 1766.
 - ii) The price of electricity is going up _____ October.
 - iii) I've been invited to a wedding _____ 14th February 2023.
 - iv) Money isn't a solution _____ every problem.
 - v) There is a difference _____ Pulao and Briyani.
 - vi) Vegetables are costly _____ Islands.
 - vii) What was the answer _____ question 3 in the test?

UNIT – III

5. a) What was the turning point in Prof. Stephen Hawking's life? [7M]
- b) Write a letter to the Counsellor of your locality seeking a solution to the problem of potholes in the main roads of your area. [7M]

(OR)

6. a) How does Virginia Woolf use the fictional character of Shakespeare's sister to explore the limitations and societal expectations placed on women in the past? [7M]

- b) Correct the following sentences
- He accused him of cheating but he denied.
 - They need description of the stolen car
 - One of my books are missing
 - The wound took several weeks to settle.
 - I prefers classical music to pop
 - Hilde chose of source of energy as her topic
 - He went the cinema to relax on weekend.

UNIT - IV

7. a) How does Wangari Maathai's upbringing in rural Kenya shape her activism and worldview in the book "Unbowed"?
- b) Edit the following text correcting spelling, punctuation, syntax, vocabulary etc.
- definitions of the word literature tend to be circularThe 11th edition of
merriam-Webster's Collegiate Dictionary considers
literature to be writings having excellence of form or expression and expressing
ideas of permanent or universal interest
As an art literature might be described as the organization of words to give
pleasure

(OR)

8. a) How does Soyinka use the conversation between the West African man and the British landlady to reveal the absurdity of racial prejudice?
- b) Rewrite as directed
- She said, "I don't have a computer" (change into indirect speech)
 - She said Lucy owned three flats in the city (change into direct speech)
 - Rose is _____ upset about losing her job (terrible / terribly)
 - Sara is smarter than Nakul (Change into Positive form)
 - Ani is an intelligent student in the class. (Change into Superlative)
 - This is the longest book. (Change into comparative)
 - There are _____ people waiting for your arrival. (much, many)

UNIT - V

9. a) How does the concept of "Stay Hungry, Stay Foolish" encourage individuals to take risks and pursue their passions?
- b) Develop a dialogue between a doctor and a student on the benefits of practicing yoga every day in pandemic situation.

(OR)

- 10 a) What is the significance of the final stanza in "Still I Rise," and how does it serve to reinforce the poem's overall message?
- b) Prepare a poster presentation on 'Benefits of Time management' use creative effective expressions.

2 of 2

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I.B. Tech I Semester Regular/Supplementary Examinations, February - 2023
COMMUNICATIVE ENGLISH
 (Common to All Branches)

Time: 3 hours

Max. Marks: 70

*Answer any FIVE Questions ONE Question from Each Unit
 All Questions Carry Equal Marks*

UNIT – I

1. a) What were the articles kept in the drawer? [7M]
 b) Write a paragraph on 'Benefits of online Teaching and Learning' [7M]

(OR)

2. a) How does the theme of deliverance play out in the story, and what is its significance? [7M]
 b) Punctuate the following passage [7M]

Isaac Newton was born on January 4 1643 in Woolsthorpe Lincolnshire England he is a son of a farmer who died three months before he was born Newton spent most of his early years with his maternal grandmother after his mother remarried after all the hardships in personal life he is best known for having invented the calculus in the mid to late 1660sand for having formulated the theory of universal gravity

UNIT – II

3. a) What does Nehru say about the current state of India and the role of the Freedom Movement led by Mahatma Gandhi in it? [7M]
 b) Give Synonyms of the following
 (i) Forecast ii) Subside iii) Demystify iv) Update

Give Antonyms of the following

(i) Establish ii) Compile iii) Optimize

(OR)

4. a) Explain with reference to the context: "But you came with a mind large as the sky to my pocket size house". [7M]
 b) Fill in the blanks with suitable Prepositions [7M]

- i) Hurry up! We've got to go _____ five minutes
- ii) I'm busy just now but I'll be with you _____ a moment
- iii) There are usually a lot of parties _____ New Year's Eve.
- iv) What was Emma's reaction _____ the news?
- v) Ken showed me a photograph _____ the house where he lived as a child.
- vi) There are some differences _____ British and American English.
- vii) There is a reason _____ everything.

UNIT – III

5. a) Elaborate on Stephen Hawking's contributions to the field of science. [7M]
 b) Write a letter to the Mayor of your locality seeking a solution to the problem of stray dogs in your area. [7M]

(OR)

6. a) In "Shakespeare's Sister," what argument does Woolf make about the role of education and opportunity in the development of artistic talent? [7M]



- b) Correct the following sentences
- It's not allowed to talk in the library.
 - Do keep out your sleepers outside of laboratory.
 - An adult like to drive car.
 - Raja is going to the club house.
 - She almost couldn't breathe.
 - I was very alone at first before making friends.
 - Walking along the city at late nights should be avoided.

UNIT – IV

7. a) What role did the Green Belt Movement play in Maathai's activism and how does she describe its impact in "Unbowed"?
- b) Edit the following text correcting spelling, punctuation, syntax, vocabulary etc.
 Thermoelectric power generators consist of three major components thermoelectric materials thermoelectric modules and thermoelectric systems that interface with the heat source using thermoelectric modules a thermoelectric system generates power by taking in heat from a source such as a hot exhaust flue To operate the system needs a large temperature gradient which is not easy in real-world applications.

(OR)

8. a) What techniques does Soyinka use to convey the tension and frustration experienced by the protagonist in the poem?
- b) Rewrite as directed
- She told me, "They work in Hong Kong" (Change into indirect speech)
 - She said she never got up early on Sundays (Change into Direct speech)
 - There was a _____ change in the weather. (sudden/ suddenly)
 - Agra is more famous than Charminar (Change into Positive form)
 - This poem is as lyrical as the other. (Change into Superlative)
 - This is the farthest airport. (Change into comparative)
 - Come and see me _____ time you want. (any, some)

UNIT – V

9. a) How does "Stay Hungry, Stay Foolish" relate to the idea of innovation and growth in business and in life?
- b) Develop a dialogue between the President of India and a women student on the possibility of women empowerment in India.

(OR)

- 10 a) In what ways does Maya Angelou's choice of diction in "Still I Rise" reflect the poem's message of empowerment and self-reliance?
- b) Prepare a poster presentation on the topic 'Importance of Yoga' use effective expressions.

2 of 2

I B. Tech I Semester Regular/Supplementary Examinations, February - 2023
APPLIED PHYSICS

(Common to CSE, CSE CS&T, IT , CSE-CS, CSE-IOT&CS incl BCT, CSE-CS & BS, CSE-IOT, CS, IOT)

Time: 3 hours

Max. Marks: 70

*Answer any FIVE Questions ONE Question from Each Unit
 All Questions Carry Equal Marks*

UNIT-I

1. a) Give the analytical treatment of interference of light. [5M]
- b) Obtain the condition for maximum and minimum intensity of light in Newton's ring experiment. [9M]

(OR)

2. a) Obtain the condition for primary and secondary maxima in Fraunhofer diffraction due to a single slit. [10M]
- b) Derive an expression for width of the central maxima. [4M]

UNIT-II

3. a) What is meant by LASER? Explain the characteristics of lasers? Write a few applications of Lasers. [9M]
- b) Explain the terms absorption, spontaneous and stimulated emission. [5M]

(OR)

4. a) Describe the construction of an optical fiber and give dimensions of various parts. [9M]
- b) Explain the principle behind the functioning of an optical fiber. [5M]

UNIT-III

5. a) Derive the time dependent Schrodinger wave equation. [9M]
- b) What are matter waves? Explain their properties. [5M]

(OR)

6. a) Explain the quantum free electron theory of metal. [9M]
- b) Explain salient features of quantum free electron theory. [5M]

UNIT-IV

7. a) Describe the phenomenon of electronic polarization and obtain the expression for electronic polarizability. [9M]
- b) Show that the relation between dielectric constant and susceptibility is $\epsilon_r = 1 + \chi$ [5M]

(OR)

8. a) Define the magnetic moment? Explain the origin of magnetic moment at the atomic level. [10M]
- b) Define the terms susceptibility and magnetic flux density. [4M]

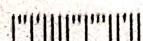
UNIT-V

9. a) Derive an expression for the density of holes in the valence band of an intrinsic semiconductor. [10M]
- b) Write a note on intrinsic semiconductors. [4M]

(OR)

10. a) Describe the BCS theory of superconductors. [10M]
- b) Write a short note on Isotopic effect and energygap in semiconductor. [4M]

1 of 1



R20

Code No: R201117

I.B. Tech I Semester Regular/Supplementary Examinations, February - 2017
APPLIED PHYSICS
(Common to CSE, CSE-CS&T, IT, CSE-CS, CSE-IOT&CS incl BCT, CSE-CS & BS, CSE-CS, IOT)

Max. Marks

Time: 3 hours

Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks

UNIT-I

1. a) Explain the Fraunhofer diffraction due to single slit.
- b) Derive the principle and working of interference in thin films.

(OR)

2. a) With the help of neat diagram, explain the working of Nicol's prism in half wave plate mode.
- b) Explain the phenomenon of double refraction.

UNIT-II

3. a) Write the principle and working of He-Ne laser with the neat diagram.
- b) Write about spontaneous and stimulated emission.

(OR)

4. a) Classify and explain the optical fibers based on refractive index profile.
- b) Discuss about the acceptance angle in optical fibers.

UNIT-III

5. a) Discuss about the dual nature of matter.
- b) Explain the Heisenberg Uncertainty principle

(OR)

6. a) Discuss the Classical free electron theory.
- b) Explain the density of states (3D).

UNIT-IV

7. a) Explain different types of polarizations.
- b) Derive the Clausius-Mossotti equation.

(OR)

8. a) Explain different types of magnetic materials with properties
- b) Explain hysteresis loop in magnetic materials.

UNIT-V

9. a) Write the difference between intrinsic and extrinsic semiconductors.
- b) Derive the equation for density of charge carriers in extrinsic semiconductors

(OR)

10. a) What is a superconductor? Write the properties and applications of superconductors.
- b) Write the Meissner effect in superconductors.

1 of 1

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I B. Tech I Semester Regular/Supplementary Examinations, February - 2023
APPLIED PHYSICS

(Common to CSE, CSE-CS&T, IT, CSE-CS, CSE-IOT&CS incl BCT, CSE-CS & BS, CSE-IOT, CS, IOT)

Time: 3 hours

Max. Marks: 70

*Answer any FIVE Questions ONE Question from Each Unit
 All Questions Carry Equal Marks*

UNIT-I

1. a) Discuss in detail Fraunhofer diffraction due to double slit and draw the intensity distribution curve. [10M]
 b) Discuss the theory of diffraction grating [4M]

(OR)

2. a) Give the principle and working of Nicol's prism in quarter wave plate with neat diagram. [10M]
 b) Give a brief note on double refraction. [4M]

UNIT-II

3. a) Derive the relation between probabilities of spontaneous emission and stimulated emission in terms of Einstein coefficients. [10M]
 b) Write a few applications of lasers. [4M]

(OR)

4. a) What is meant by acceptance angle for a optical fiber? Obtain mathematical expression for acceptance angle and numerical aperture. [10M]
 b) Explain different types of optical fibers. [4M]

UNIT-III

5. a) Derive the time independent Schrodinger wave equation. [10M]
 b) Explain the physical significance of wave equation. [4M]

(OR)

6. a) Explain the concept of effective mass of an electron. [9M]
 b) Explain the origin of energy bands in solids. [5M]

UNIT-IV

7. a) Describe the phenomenon of ionic polarization and obtain the expression for ionic polarizability. [10M]
 b) Briefly explain piezoelectricity. [4M]

(OR)

8. a) Explain the Domain theory of Ferromagnetism. [9M]
 b) Explain the soft and hard magnetic materials with properties. [5M]

UNIT-V

9. a) Derive the expression for concentration of electrons in the valence band of an intrinsic semiconductor. [10M]
 b) Write the difference between intrinsic and extrinsic semiconductors. [4M]

(OR)

10. a) Explain the thermal properties of superconductors. [8M]
 b) Write the applications of super conductors. [6M]

1 of 1

I B. Tech I Semester Regular/Supplementary Examinations, February - 2023**APPLIED CHEMISTRY**

(Common to ECE, EIE, ECT, CSE-AI&ML, CSE-AI, CSE-DS, CSE-AI&DS, AI&DS, AIML, CSO)

Time: 3 hours

Max. Marks: 70

*Answer any FIVE Questions ONE Question from Each Unit**All Questions Carry Equal Marks***UNIT-I**

1. a) What are polymer composites? Write the advantages of polymer composites. [7M]
 b) Explain about suspension polymerization with examples. [7M]

(OR)

2. a) Is there any use of plastic in electronic gadgets industry? Explain with examples. [7M]
 b) What are biopolymers? Give some examples, write their properties and applications. [7M]

UNIT-II

3. a) Distinguish between chemical corrosion and electrochemical corrosion. [7M]
 b) Explain the working principle of methanol-oxygen fuel cell with reactions. [7M]

(OR)

4. a) Explain impressed cathodic current techniques for the preventions of corrosion with a suitable diagram. [7M]
 b) What is electrochemical series? Give its applications. [7M]

UNIT-III

5. a) What are magnetic materials? Classify the various magnetic materials with examples. [7M]
 b) Write about Brunauer Emmet Teller (BET) and scanning electron microscopy (SEM) characterization techniques. [7M]

(OR)

6. a) Explain the conduction phenomenon in stoichiometric and chalcogen semiconductors. [7M]
 b) What are liquid crystals? Briefly explain the classification of liquid crystals. [7M]

UNIT-IV

7. a) Explain the following with respect to UV-visible spectroscopy. [7M]
 (i) Bathochromic or red shift; (ii) Hypsochromic or blue shift
 (iii) Hypochromic shift; (iv) Hyperchromic shift
 b) What is geothermal energy? How is it used to generate electrical power? Discuss its merits and limitations. [7M]

(OR)

8. a) Write the three applications of UV and IR spectroscopy. [7M]
 b) What is hydro energy? Explain the principle of generating electricity from hydro energy. What are some benefits and limitations of hydropower [7M]

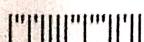
UNIT-V

9. a) What is molecular docking? Write its applications? [7M]
 b) Briefly discuss about an autonomous light powered molecular motor. [7M]

(OR)

10. a) What are rotaxanes and catenanes? Why are they used as artificial molecular machines? Explain. [7M]
 b) Briefly discuss about acid-base controlled molecular shuttle. [7M]

1 of 1



3. Tech I Semester Regular/Supplementary Examinations, February - 2023

APPLIED CHEMISTRY

(Common to ECE, EIE, ECT, CSE-AI&ML, CSE-AI, CSE-DS, CSE-AI&DS, AI&DS, AIMAL, CSD)

3 hours

Max. Marks: 70

*Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks*

UNIT-I

- a) Define the functions of each ingredient in suspension polymerization with examples. [7M]
- b) What are conducting polymers? How does a non-conducting polymer become conducting? Explain various uses of conducting polymer.

(OR)

- a) What is fabrication of plastics? Explain injection moulding process with a neat diagram. [7M]
- b) Discuss about bio degradable polymers. [7M]

UNIT-II

- a) What is paint? What are the constituents and their functions in paint? [7M]
- b) What is galvanic corrosion? Discuss. [7M]
- (OR)
1. a) What are secondary cells? Explain the construction and working of Lithium ion battery. Write down the reactions taking place during charging and discharging of battery. [7M]
- b) What are metallic coatings? Describe the electroplating method with the help of neat diagram. [7M]

UNIT-III

5. a) Write short notes on:
(i) p-n junction diode as a rectifier(ii) p-n junction diode as a transistor [7M]
- b) Write short notes on:
(i) Thermotropic liquid crystals(ii) Lyotropic liquid crystals [7M]
- (OR)
6. a) Explain in detail the various applications of liquid crystals. [7M]
- b) What is a superconductor? Write the properties of superconductors. [7M]

UNIT-IV

7. a) Explain the Franck – Condon principle. Using suitable potential energy curves illustrate the Franck Condon principle in the vibronic spectrum of a diatomic molecule. [7M]
- b) How is wave energy harnessed? Discuss the technology used to obtain energy from waves and write its limitations. [7M]

(OR)

8. a) Explain the following
(i) Allowed and forbidden transitions (ii) Chromophore (iii) Auxochrome [7M]
- b) Explain about the Ocean Thermal Energy Conversion. [7M]

UNIT-V

9. a) What is autonomous light powered molecular motor? Explain. [7M]
- b) What is meant by molecular docking? How many types of molecular docking are there and write their uses. [7M]

(OR)

10. a) What is molecular elevator? Explain. [7M]
- b) What are the main types of molecular motors? Explain [7M]

1 of 1

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R20

Code No: R201115

I.B. Tech I Semester Regular/Supplementary Examinations, February

APPLIED CHEMISTRY

(Common to ECE, EIE, ECT, CSE-AI&ML, CSE-AI, CSE-DS, CSE-AI&DS, AI&DS, AIA)

Max. Marks

Time: 3 hours

Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks

UNIT-I

1. a) what are biodegradable polymers give some examples and write their applications.
b) What are the various mechanical properties of a polymer? Explain.
- (OR)
2. a) What are composite materials? Discuss some important types of fibre-reinforced composites.
b) What is Buna-S, thiokol and polyurethanes? Write their preparation, properties and uses?

UNIT-II

3. a) What is Chemical corrosion? Explain with its types.
b) What are fuel cells? Explain the hydrogen-oxygen fuel cell and its advantages.
- (OR)
4. a) What are reference electrodes? Describe the construction and working of a glass electrode. How can it be used for the determination of pH of a solution?
b) What are the factors influencing corrosion?

UNIT-III

5. a) What are chalcogen semiconductors? Explain their application as light sensitive semiconductors.
b) Write the preparation and applications of Fullerenes and Carbon nanotubes.
- (OR)
6. a) Define Nanochemistry. Explain with the help of suitable examples how the properties of nanomaterials differ from those of the same materials in bulk size.
b) What is a superconductor? Explain the difference between type I and type II superconductors.

UNIT-IV

7. a) Why is UV-visible spectroscopy called as electronic spectroscopy? What is the absorption range? Explain the Beer-Lambert's law.
b) How is wind energy used for the generation of electric power? Discuss the merits and limitations of wind energy.

UNIT-V

8. a) What is an Magnetic Resonance Imaging (MRI) briefly explain how it works?
b) What are tides? Explain its working to generate electricity from tides and limitations.
- (OR)
9. a) Explain the characteristics of molecular motors.
b) what are molecular machines? Explain with examples.

UNIT-V

10. a) What is an acid-base controlled molecular shuttle? Explain.
b) What is the purpose of molecular motors? How does a molecular motor work?
Explain.

1 of 1



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I B. Tech I Semester Regular/Supplementary Examinations, February - 2023**PROGRAMMING FOR PROBLEM SOLVING USING C**

(Common to EEE, ME, ECE, CSE, CSE-CS&T, EIE, IT, ECT, Auto Eng, Min Eng, Pet Eng, CSE-AI&ML, CSE-AI, CSE-DS, CSE-AI&DS, CSE-CS, CSE-IOT &CS Incl BCT, CSE-CS & BS, CSE-IOT, Food Eng, AI&DS)

Time: 3 hours

Max. Marks: 70

*Answer any FIVE Questions ONE Question from Each Unit
All Questions Carry Equal Marks*

UNIT - I

1. a) How are the expressions evaluated in C? Explain the role of precedence and associativity in it. Give example. [7M]
- b) Illustrate the various storage classes used in C program. Explain each with a simple program. [7M]

(OR)

2. a) What is scope of variable? Explain block scope, function scope program scope and file scope with an example program [7M]
- b) Write a C program to count number of vowels in an input text taken through command line arguments. [7M]

UNIT - II

3. a) Read the marks of eight subjects and calculate the percentage of marks. The program should output following grades based on percentage of marks obtained in the eight subjects. Use nested if statement to write the code. [7M]

Percentage Marks	80 to 100	70-79	60-69	50-59	Less than 49
Grade	Excellent	Very Good	Good	Satisfactory	Fail

- b) What is a loop? Explain different statements in C with example. [7M]

(OR)

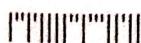
4. a) Explain different bitwise operators available in C with examples. [7M]
- b) What is the need of do-while and while loops? Discuss about their usage. [7M]
Distinguish between them.

UNIT - III

5. a) Using structures write a program to read and display the information of all the students in a class. [7M]
- b) Write a short note on operations on arrays. And write a program to print the position of smallest of 'n' numbers using arrays. [7M]

(OR)

6. a) Write a C Program to find number of characters in a given string without using library function. [7M]
- b) What are subscripted variables? How one and two dimensional subscripted variables (arrays) are declared? [7M]



(OR)

8. a) What is address arithmetic in C? Explain different arithmetic operations that can be performed on pointers.
b) What is the role of L value and R Value in pointer arithmetic? Explain in detail.

UNIT - V

9. a) Explain the following functions in file operations:
(i) getw() (ii) putw() (iii) fscanf() (iv) fprintf()
b) What is an user defined function? When these functions are useful? How a function is declared and what are the rules followed to call a function.

(OR)

- 10 a) Write a C program to copy the content of one file into another file.
b) Explain about call by value and call by reference with reference to functions.
Write a function to swap the values between the variables using call by value and call by reference.

2 of 2