R16

I B.TECH I SEM

SUPPLEMENTARY EXAMINATIONS

MARCH 2025

Narasaraopeta Engineering College (Autonomous)

NEC Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R16CC1102

I B.Tech I Semester Supple Examinations, March-2025
ENGINEERING MATHEMATICS
(Common to CE, EEE, ME, ECE & CSE)

Time: 3 hours   Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) State the Newton's law of cooling.
   (b) State the Kirchhoff Voltage Law.
   (c) Define saddle point and extreme point.
   (d) Define total derivative.
   (e) Form a partial differential equation z=f(x² + y²) by eliminating the arbitrary function ' f '.
   (f) State the one dimensional wave equation.

                                                                    [2+2+2+2+2+2]

PART-B

                                                                    4X 12 = 48

2. Show that the family of confocal conics $\dfrac{x^2}{a^2+\lambda}+\dfrac{y^2}{b^2+\lambda}=1$, where λ is a parameter is

   Self-orthogonal.

3. Solve $(D^2 +a^2)y = \sec ax$.

4. (a) Find the maximum and minimum values of f(x, y) = Sin(x + y) + Sin x + Sin y
   (b) Verify Taylor's theorem for $f(x) = (1-x^2)^{5/2}$ with Lagrange's form of remainder upto 2 terms
       in the interval [0, 1].

5. (a) If $u = x \log(xy)$ where $x^3 + y^3 +3xy = 1$ find $\dfrac{du}{dx}$.

   (b) Verify the function u = x + y + z, v = x² + y² + z² and w = x³ + y³ + z³ − 3xyz are functionally
       dependent or independent. If they are dependent, find the relation between them.

6. (a) Eliminating the arbitrary constants a, b, c from $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}+\dfrac{z^2}{c^2}=1$.

   (b) Eliminating the arbitrary function f and g from z = f(2x + 3y) + g(2x - y)
7. (a) Solve (x²/p)+(y²/q)= z
   (b) A tightly stretched string with fixed end points x = 0 and x = 1 is initially in a position given
       by y = y sin³ (π x/l) . If it is released from rest from this position, find the displacement y(x, t).

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Subject Code: R16CC1104

I B.Tech I Semester Supple Examinations, March-2025
PROGRAMMING WITH C
(Common to CE, EEE & ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1) (a) Define an algorithm.
   (b) What are strings in C?
   (c) Explain the concept of modular programming.
   (d) What is address arithmetic?
   (e) What are bit-fields in C?
   (f) Explain the purpose of file pointers in C.

[2+2+2+2+2+2]

PART-B

2) (a) What are identifiers in C? What rules should be followed while naming identifiers?
   (b) Describe the process of compiling and running a C program. What tools are typically used for this purpose?

[6+6]

3) (a) Write a C program that counts the number of vowels, consonants, digits, and spaces in a given string.
   (b) Explain how to declare, define, and access elements in a multidimensional array in C. Provide a code example that initializes a 3x3x3 array with the value of its indices' sum.

[6+6]

4) (a) Write a C program to solve the Tower of Hanoi problem using recursion. How does recursion simplify the solution to this problem?
   (b) What are header files in C? Explain their purpose and usage with examples.

[6+6]

5) (a) Explain the difference between passing arguments to a function by value and by address. Provide examples of both.
   (b) Develop a C program that accepts a filename as a command-line argument and counts the number of lines in the file.

[6+6]

6) (a) What is a union in C? How does a union differ from a structure?
   (b) What is a nested structure in C? Write a C program that declares a nested structure to represent a date (day, month, year) inside an employee structure.

[6+6]

7) (a) What is random access in file handling? How does it differ from sequential access?
   (b) Discuss the importance of error handling in file operations. How can errors be detected and managed in C while working with files.

[6+6]

Subject Code: R16CC1105

I B.Tech I Semester Supple Examinations, March-2025
ENGINEERING CHEMISTRY
(Common to CE, EEE & ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) How can exhausted anionic and cationic ion-exchange resins be regenerated?
   (b) Write the applications of Thiokol rubber.
   (c) What are carbon nanotubes?
   (d) Define corrosion.
   (e) What is meant by cracking?
   (f) Define Lambert's Beer Law.

   [2+2+2+2+2+2]

PART-B

4X 12 = 48

2. (a) Discuss internal treatment methods used for softening of hard water.
   (b) Explain estimation of hardness by EDTA method.

3. (a) Discuss classification of polymers with examples.
   (b) Explain compounding of plastics.

4. (a) Explain the principles of green chemistry.
   (b) Discuss preparation of Portland cement by wet process.

5. (a) Explain working of Ni-Cd and alkaline battery.
   (b) Discuss factors affecting rate of corrosion.

6. (a) Explain proximate analysis of coal sample. Explain its significance.
   (b) Discuss Fisher's Tropsch method with a neat labelled diagram.

7. (a) Explain Jablonski diagram.
   (b) Discuss applications of photochemistry.

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Subject Code: R16CC1107

I B.Tech I Semester Supple Examinations, March-2025
ENGINEERING GRAPHICS
(Common to ECE & CSE)

Time: 3 hours   **Max Marks: 60**

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1.(a) Construct a regular hexagon with a side of 40mm.   (4M)

  (b) Draw the projections of a point B, on the H.P. and 30 mm below the V.P.   (2M)

  (c) Point A, 25 mm above the H.P. and 50 mm in front of V.P. Draw its projections. (2M)

  (d) Draw a cone, base 40mm diameter and axis 50mm long resting on the HP on their
respective bases.   (4M)

PART-B

         4X 12 = 48

2. (a) The major axis of an ellipse is 150mm long and the minor axis is 90mm long. Find the foci
and draw the ellipse by arcs of circles method. Draw a tangent to the ellipse at a point on it
25mm above the major axis.

  (b) Construct a diagonal scale of R.F=1/32 showing yards, feet and inches to measure up to 4
yards. Show 1 yard 2 feet 7 inches on it.

3. (a) A line RS measuring 52mm is in HP and inclined at an angle of 45^0 end R is 10mm in front of
VP. Draw the projections.

  (b) A point P is 25mm below HP and lies in the third quadrant. Its shortest distance from xy is
45mm. Draw it projections.

4. The top view of a 75mm long line AB measures 65mm, while the length of its front view is
50mm. Its one end A is in the HP and 12mm in front of the VP. Draw the projections of AB and
determine its inclinations with the HP and the VP.

5. A circular lamina of 60mm diameter rests on HP on a point 1 on the circumference. The lamina
is inclined to HP such that the top view of it is an ellipse of minor axis 35mm. The top view of the
diameter through the point 1 makes an angle of 45^0 with VP.

(i) Draw the projections   (ii) Determine the angle made by the lamina with HP.

6. Draw the projections of a pentagonal prism, base 30mm side and axis 60mm long, resting on one
of its rectangular faces on the ground, with the axis inclined at 45^0 to the VP.

7. Draw (i) Front View   (ii) Top View   (iii) Side View   for the below figure.
   (All dimensions are in mm).

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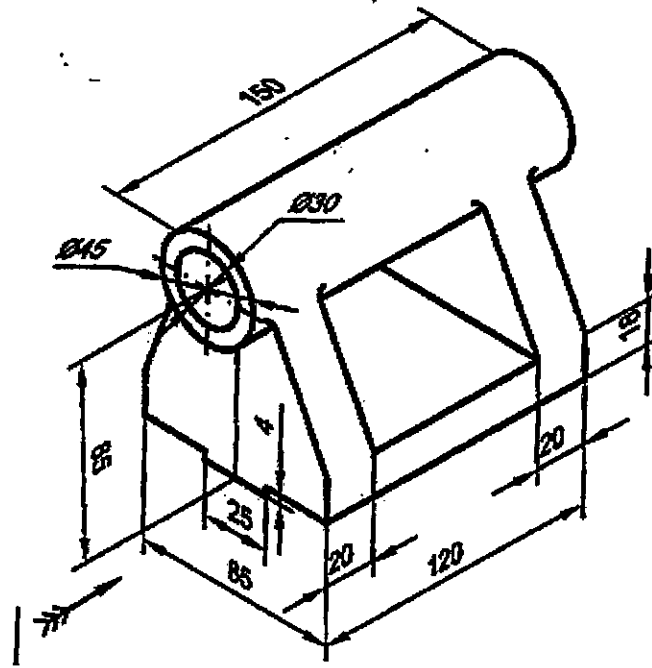
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Subject Code: R16CC1108

I B.Tech I Semester Supple Examinations, March-2025
ENGINEERING PHYSICS
(Common to ECE & CSE)

Time: 3 hours
Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B.**
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) What is optic axis and principal section in calcite crystal?
   (b) Define acceptance angle of a cone in the optical fiber.
   (c) Define non-primitive unit cell. Give examples.
   (d) Discuss any four properties of ultrasonic waves.
   (e) Describe the significance of wave function.
   (f) Discuss the importance of Fermi energy level in semiconductors.

   [2+2+2+2+2+2]

PART-B

4X 12 = 48

2. (a) Describe the construction and working of Newton's ring experiment. Derive the radius of curvature of the given plano-convex lens using this experiment. [8M]
   (b) Differentiate quarter and half wave plate. Mention its applications. [4M]

3. (a) Derive the relation between numerical aperture and refractive indices of the core and cladding. Mention the importance of numerical aperture. [6M]
   (b) Discuss the construction and working of ruby laser. Mention its limitations and advantages. [6M]

4. (a) State and Explain Bragg's law and its significance in the determination of crystal structure. Discuss its limitations. [6M]
   (b) Prove that the FCC crystal systems are densely packed than compared to BCC crystal systems. [6M]

5. (a) Discuss the construction and working of magnetostriction oscillator. Mention its limitations and advantages. [7M]
   (b) Explain the basic requirements for good acoustic design of buildings. [5M]

6. (a) Assuming Schrodinger time independent wave equation, derive the energy and probability density function for a particle enclosed in a potential well of infinite height for ground and two excited states. [8M]
   (b) Discuss the limitations and merits of quantum free electron theory of metals. [4M]

7. (a) Using Kronig-Penny model, mention the boundary conditions and discuss the origin of band theory to classify the solids. [8M]

(b) Prove that the Fermi energy level lies in the middle of the band gap in an intrinsic semiconductors. [4M]

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