

R16

I B.TECH. I SEM

SUPPLEMENTARY EXAMINATIONS

MARCH 2022



Subject Code: R16CC1102

I B.Tech I Semester Supple Examinations, March-2022

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) Given  $\frac{dy}{dx} + 2xy = 2e^{-x^2}$ , find the value of  $y$
- (b) Solve  $\frac{d^2x}{dt^2} + 5\frac{dx}{dt} + 6x = 0$
- (c) Find the value of  $\lim_{x \rightarrow 0} \left( \frac{1}{\sin x} - \frac{1}{x} \right)$
- (d) If  $u = x \log xy$ , where  $x^3 + y^3 + 3xy = 1$ , find the value of  $\frac{du}{dx}$
- (e) Form the partial differential equation by eliminating  $a$  and  $b$  from  $z = (x^2 + a^2)(y^2 + b^2)$
- (f) Solve the partial differential equation  $(D^3 + D^2D' - DD'^2 - D^4)z = 0$

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

**PART-B**

4X 12 = 48

2. (a) Solve  $(1+xy)y dx + (1-xy)x dy = 0$
- (b) Find the orthogonal trajectories of semi cubical parabolas  $ay^2 = x^3$ , where  $a$  is a parameter.
3. (a) Solve  $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = (1+x)^2$
- (b) If the distance  $x$  of a point moving on a straight line measured from a fixed point on it and its velocity  $v$  are connected by the relation  $4v^2 = 25 - x^2$ , show that the motion is simple harmonic. Find the period and amplitude of the motion.
4. (a) If  $f(x) = \log(1+x)$ ,  $x > 0$ , using Maclaurin's theorem show that for  $0 < \theta < 1$ ,  
$$\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3(1+\theta x)^3}$$
- (b) Prove that  $x \sin x + \cos x + \frac{1}{2} \cos^2 x$  is strictly increasing in  $\left(0, \frac{\pi}{2}\right)$

5. (a) Examine  $f(x, y) = x^3 + y^3 - 12x - 3y + 20$  for its extreme values.  
(b) Find the maximum value of  $x^m y^n z^p$  subject to  $x + y + z = a$ .
6. (a) Find the partial differential equation by eliminating  $f$  from  $z = xy + f(x^2 + y^2 + z^2)$   
(b) Solve  $\frac{\partial z}{\partial x} = 6x + 3y$  and  $\frac{\partial z}{\partial y} = 3x - 4y$
7. A tightly stretched string with fixed ends  $x = 0$  and  $x = l$  is initially in a position given by  $y(x, 0) = y_0 \sin^3 \frac{\pi x}{l}$ . If it is released from rest from this position, find the displacement  $y$  at any distance  $x$  from one end and at any time  $t$ .

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Subject Code: R16CC1103

**I B.Tech I Semester Supple Examinations, March-2022**

**MATHEMATICAL METHODS**  
(Common to CE, EEE, ME & ECE)

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 you say that a matrix is in Echelon form
- (b) Explain Diagonalization
- (c) Evaluate  $\int_{x=0}^a \int_{y=0}^b (x^2 + y^2) dy dx$
- (d) Using Newton Raphson formula, find the square root of 5.
- (e) Explain Shift operator.
- (f) Derive the Trapezoidal rule from Newton-Cotes formula.

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

**PART-B**

4X 12 = 48

2. (a) Using Normal form, find the rank of the matrix  $A = \begin{bmatrix} 1 & 3 & 4 & 3 \\ 3 & 9 & 12 & 9 \\ 1 & 3 & 4 & 1 \end{bmatrix}$
- (b) Solve the equations  $x + y + z = 6$ ,  $x - y + z = 2$ ,  $2x - y + 3z = 9$  by Gauss Jordan Method.

3. (a) Find the Eigen values and Eigen vectors of the matrix  $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$

- (b) Find the Characteristic equation of the matrix  $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$  and verify Cayley-Hamilton theorem and find  $A^{-1}$ .

4. (a) Evaluate  $\int_0^1 \int_{x^2}^{2-x} xy dx dy$  by using change of order of integration.

- (b) Evaluate  $\iiint xyz dx dy dz$  taken over the volume bounded by the sphere  $x^2 + y^2 + z^2 = a^2$  is first octant using spherical coordinates.

5. (a) Find a real root of the equation  $x^3 - 2x^2 - 4 = 0$  using iteration method.

- (b) Consider the following data for  $f(x) = \frac{\sin(x)}{x^2}$

x	0.1	0.2	0.3	0.4	0.5
f(x)	9.9833	4.9696	3.2836	2.4339	1.9177

Calculate  $f(0.25)$  accurately using Newton's forward method of interpolation.

6. (a) Use Gauss Forward interpolation formula to find  $f(3.3)$  from the following table:

x	1	2	3	4	5
f(x)	15.30	15.10	15.00	14.50	14.00

(b)

Find the unique polynomial  $p(x)$  of degree 2 or less such that  $p(1) = 1$ ,  $p(3) = 27$ ,  $p(4) = 64$  using Lagrange's interpolation formula.

7. (a) Solve  $y' = x - y^2$ ,  $y(0) = 1$  using Taylor's series method and compute  $y(0.1)$  and  $y(0.2)$ .

(b) Using Modified Euler's method find  $y(0.2)$  and  $y(0.4)$ , given  $y' = y + e^x$ ,  $y(0) = 1$ .

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Subject Code: R16CC1104

I B.Tech I Semester Supple Examinations, March-2022

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) What will be the output of the following code segment?

```
int a=1;
b=++a + ++a;
c=a++ + a++;
printf("A=%d\tB=%d\tC=%d\n",a,b,c);
```

(b) Give the output of the given program code and justify your answer.

```
#include<stdio.h>
int main()
{
int s=0;
while(s++ < 10) {
if((s<6)&&(s<7)) continue;
printf("%d\n",s);
}
return 0;
}
```

*20256111045, a*

(c) Explain how to pass Two dimensional arrays as arguments in the functions

(d) What is a dangling pointer

(e) How to access structure members using pointers, explain with example

(f) Explain various formatted input/output functions in C

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

**PART-B**

4X 12 = 48

2. (a) Design a flowchart to check whether the given number is prime number or not [6M]

(b) Write a program to read two integers with the following significance. [6M]

The first integer value represents a time of day on a 24 hour clock, for example 1245 represents afternoon 12 hours 45 minutes. The second integer represents a time duration in a similar way, so that 345 represents three hours and 45 minutes. This duration is to be added to the first time, and the result printed out in the same notation, in this case 1630 which is the time 3 hours and 45 minutes after 12:45.

3. (a) Explain any 4 string library functions [6M]  
 (b) Design an algorithm and write a program for generation of spiral matrix as follows [6M]  
 for given n=4

1	2	3	4
1	1	1	5
2	3	4	
1	1	1	6
1	6	5	
1	9	8	7
0			

4. (a) Explain various storage classes in C [5M]  
 (b) Write a recursive function to solve the towers of Hanoi problem [7M]
5. (a) Differentiate Call by value and Call by address with suitable examples [6M]  
 (b) Write a program to allocate a memory for N elements and perform sum of N given numbers using pointers. [6M]
6. (a) Differentiate Structure and Union in C [4M]  
 (b) Write a C Program to perform arithmetic operations (+,-,\*,/) on complex numbers using structures [8M]
7. (a) Discuss various file opening modes [6M]  
 (b) Write a program to display the contents of file in the reverse order [6M]

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Subject Code: R16CC1105

**I B.Tech I Semester Supple Examinations, March-2022**

**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) The end point for titration of wine red solution of Ca-EBT complex with EDTA at pH 10 indicates the formation of blue colour. Explain the reason for formation of blue color.
- (b) What are thermosetting plastics? Give an example.
- (c) What are lyotropic liquid crystals? Give a suitable example.
- (d) Addition of zinc metal to nitric acid results evolution of hydrogen gas, while no such evolution of hydrogen gas takes place when copper metal is added to nitric acid. Explain the observation.
- (e) State the characteristics of a good fuel.
- (f) State Grotthuss draper Law.

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

**PART-B**

4X 12 = 48

2. (a) Explain Ion-exchange method for softening of hard water with a neat diagram. [6M]
- (b) 25 mL hard water consumed 10 mL 0.05 M EDTA solution in the presence of EBT indicator at pH 10. Calculate the hardness of water. [4M]
- (c) Write down the structures of Ca-EDTA and Eriochrome Black T indicator at pH 10. [2M]
3. (a) What are polymers? Classify polymers on the basis of structure and give examples. [4M]
- (b) State the differences between addition polymerization and condensation polymerization. [5M]
- (c) Write a short note on polyvinylchloride. [3M]
4. (a) Discuss chemical vapour deposition method for the synthesis of carbon nanotubes. [3M]
- (b) Draw a flow diagram for the manufacture of Portland cement and write down the chemical reactions involved. [6M]
- (c) Explain the green synthesis of adipic acid. [3M]
5. (a) Explain working principle of dry cell with a suitable diagram and chemical reactions involved in it. Mention the limitations of the dry cell. [6M]
- (b) Explain rusting of iron with the help of electrochemical theory of corrosion. [3M]
- (c) Explain anodic sacrificial protection. [3M]
6. (a) Calculate the weight and volume of air required for combustion of one kg of carbon. [4M]
- (b) Exactly 2.5 gm of coal sample was weighed in a silica crucible. After heating for one hour at 110 °C, the residue weighed 2.415 gm. The crucible next was covered with a vented lid and strongly heated for exactly seven minutes at 950 °C. After this, the residue weighed 1.528 gm. The crucible was then heated without cover until a constant weight was obtained. The



last residue was found to weigh 0.245 gm. Calculate percentage of moisture, volatile matter, ash and fixed carbon using proximate analysis.

[4M]

- (c) Write a short note on Fischer-Tropsch Method. [4M]
7. (a) A solution of thickness 3 cm transmits 30% incident light. Calculate the concentration of the solution if molar extinction coefficient is  $4000 \text{ dm}^3\text{mol}^{-1}\text{cm}^{-1}$ . [4M]
- (b) Draw a neat Jablonski diagram and explain different photophysical processes involved when molecules are excited electronically. [6M]
- (c) State Stark Einstein Law. [2M]

\*\*\*\*\*All The Best\*\*\*\*\*



**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) Distinguish between interference and diffraction  
(b) Define the terms metastable state and pumping  
(c) State the Braggs law of X-ray diffraction.  
(d) Define piezo-electric method.  
(e) What are the drawbacks of Quantum free electron theory?  
(f) State Hall effect

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

**PART-B**

2. (a) With the help of a neat diagram, describe the experimental arrangement to produce Newton's rings by reflected light.  
(b) Prove that the diameter of dark rings is proportional to the square root of the natural numbers.  
(c) Find the thickness of a quarter wave plate when the wavelength of light is equal to  $5890 \text{ \AA}$ ,  $\mu_o = 1.55$ , and  $\mu_e = 1.54$ .  
[4+6+2]
3. (a) Describe the construction and working of He-Ne laser with relevant energy level diagram.  
(b) Derive an expression for acceptance angle in terms of refractive indices of the core and the cladding  
[6+6]
4. (a) Define packing fraction and coordination number. Obtain the expression for packing fraction of SC, BCC and FCC.  
(b) What are Miller indices? Draw the planes for the cubic unit cell: (100), (011) and (101)  
[8+4]
5. (a) State any four properties of Ultrasonics.  
(b) What is absorption coefficient? Explain how to determine the absorption coefficient.  
(c) A picture hall has a volume of  $8000 \text{ m}^3$ . It is required to have reverberation time of 1.5 s. What should be the total absorption in the hall?  
[4+6+2]
6. (a) Explain Fermi-Dirac distribution function. Plot this function for various temperatures including 0 K.  
(b) Obtain an expression for the wave function of a particle enclosed in one-dimensional potential box of infinite height.  
[6+6]
7. (a) Distinguish between conductors, semiconductors and insulators on the basis of their band structure  
(b) Deduce an expression for carrier concentration of electrons in the conduction band of an intrinsic semiconductor.  
[6+6]

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Subject Code: R16CC1107

**I B.Tech I Semester Supple Examinations, March-2022**

**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**

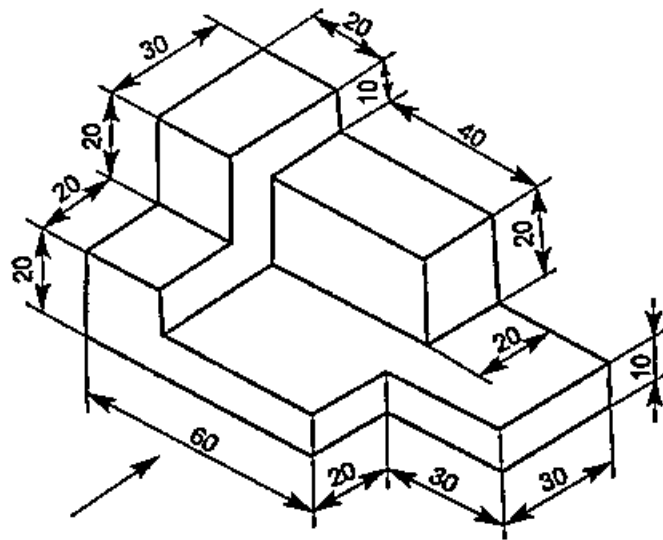
1	a)	Construct a parallelogram, having adjacent sides 50 mm and 80 mm, the angle between the adjacent sides being $60^\circ$ .
	b)	A point P is 30 mm below H.P. and 40 mm in front of V.P. Draw its projections.
	c)	A line CD of 55 mm long is parallel to both H.P. and V.P. The line is 35 mm above H.P. and 30 mm in front of V.P. Draw the projections of the line.
	d)	A regular pentagon of 25 mm side is parallel to H.P. and perpendicular to V.P. The plane is 15 mm above H.P. and an edge of it lies on V.P. Draw the projections.
	e)	Draw the projections of a cone of base 30 mm diameter and axis 50 mm long, when it is resting on H.P.
	f)	Draw the isometric view of a square prism, with side of base 40 mm and length of axis 70 mm when its axis is vertical.

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

**PART-B**

4X 12 = 48

2.	a)	The major axis of an ellipse is 120 mm long and foci are at a distance of 20 mm from its ends. Draw the ellipse by following the oblong method and draw a tangent at a distance of 35 mm from focus.	[7M]
	b)	A rectangular plot of 100 square kilometres is represented on a certain map by a similar rectangular area of 4 square centimetres. Draw a scale to show kilometres and mark a distance of 43 kilometres on it.	[5M]
3	a)	The point A is on H.P. and 40 mm in front of V.P. Another point B is on V.P. and below H.P. The line joining their front views makes an angle of $45^\circ$ with xy, while the line joining their top views makes an angle of $30^\circ$ . Find the distance of the point B from H.P.	[6M]
	b)	The top view of a line, which is 75 mm long, measures 50 mm. The line is in V.P. its one end being 25 mm above H.P. Draw its projections.	[6M]
4.		The front and top views of a line of length 90 mm, measures 75 mm and 60 mm respectively. Its one end A is 20 mm in front of V.P. and 25 mm above H.P. Draw the projections of the line and determine its inclinations with H.P. and V.P.	[12M]
5		Draw the projections of a regular hexagon of 25 mm side, having one of its sides on H.P. and inclined at $60^\circ$ to V.P. and its surface making an angle of $45^\circ$ with H.P.	[12M]
6.		A regular pentagonal prism of side of base 40 mm and length 80 mm lies with one its rectangular faces on H.P. and its axis is inclined to V.P. at $40^\circ$ . Draw the projections of the prism.	[12M]
7.		Draw the (i) Front view (ii) Top view and (iii) Side view for the following figure.	[12M]



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