

Code: 5GC24

I B.Tech. II Semester Supplementary Examinations April 2023

**Engineering Mathematics-II**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

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**UNIT-I**

1. a) Evaluate  $\int_0^5 \int_0^{x^2} x(x^2 + y^2) dy dx$

7M

b) Evaluate  $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} x y z dx dy dz$

7M

**OR**

2. a) Show that the area between the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$  is  $\frac{16}{3}a^2$

7M

b) Change the order of integration in  $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dy dx$ .

7M

**UNIT-II**

3. a) Write the Laplace Transforms of some standard functions

6M

b) Find the Laplace Transform of  $f(t) = \begin{cases} 2, & 0 \leq t \leq 1 \\ 2t, & t \geq 1 \end{cases}$

8M

**OR**

4. a) Find the Laplace Transform of i)  $\cos 2t$  ii)  $\sin 2t \sin 3t$

7M

b) Find  $L^{-1} \left\{ \frac{1}{(s-1)(s+3)} \right\}$

7M

**UNIT-III**

5. Solve  $y'' + 2y' - 3y = \sin t$ ,  $y(0) = 0$ ,  $y'(0) = 0$  Using Laplace Transform

14M

**OR**

6. Solve the differential equation  $\frac{d^2x}{dt^2} - 4\frac{dx}{dt} - 12x = e^{3t}$

given that  $x(0) = 1$ ,  $x'(0) = -2$  using Laplace Transform

14M

**UNIT-IV**

7. a) Find  $\text{div } \bar{F}$  and  $\text{curl } \bar{F}$  where  $\bar{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$

7M

b) Show that  $\text{div}(\text{grad } r^n) = n(n+1)r^{n-2}$

7M

**OR**

8. a) Find the angle between the surfaces  $x^2 + y^2 + z^2 = 9$  and  $z = x^2 + y^2 - 3$  at the point  $(2, -1, 2)$

7M

b) Prove that  $\nabla r^n = nr^{n-2}\bar{r}$  where  $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$  and  $r = |\bar{r}|$

7M

**UNIT-V**

9. Verify by Gauss Divergence theorem for  $\bar{F} = x^3\bar{i} + y^3\bar{j} + z^3\bar{k}$  taken over the cube bounded by  $x=0, x=a; y=0, y=a; z=0, z=a$

14M

**OR**

10. Verify Green's Theorem in the plane for  $\int_c [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$  where 'c'

encloses the region bounded by  $y = \sqrt{x}$  and  $y = x^2$

14M

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<b>R-15</b>
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**Code: 5GC22**

I B.Tech. II Semester Supplementary Examinations April 2023

**Engineering Chemistry**

(Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

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**UNIT-I**

Marks

1. a) Explain the process of a phosphate, carbonate and sodium aluminate conditioning of boiler feed water 7M  
b) Give detailed procedure for the determination of dissolved oxygen in water. 7M

**OR**

2. a) What is break point chlorination? State its significance. 7M  
b) Write brief account on Priming and foaming. 7M

**UNIT-II**

3. a) Explain the differential aeration corrosion with suitable examples 7M  
b) On dilution Equivalent Conductance of an electrolyte increases whereas Specific Conductance decreases. Explain. 7M

**OR**

4. a) What is meant by molar Conductance and Equivalent conductance? Write their Units? 7M  
b) Explain the composition, working and applications of Ni-Cd cell 7M

**UNIT-III**

5. a) What is vulcanization of rubber? Explain why natural rubber needs vulcanization. How is it carried out? 7M  
b) Write a note on the classification of polymers with examples 7M

**OR**

6. Differentiate Thermoplastic and Thermosetting plastics with suitable examples. 14M

**UNIT-IV**

7. a) Explain higher calorific value and lower calorific value and distinguish between the HCV & LCV. 7M  
b) Describe how synthetic petrol is synthesized from Bergius process 7M

**OR**

8. a) Calculate the gross and net calorific value of a coal sample having the following composition carbon-85% hydrogen-8% sulphur-1% hydrogen-2% ash-4% latent heat of steam 587 cal/g 7M  
b) On burning 0.83 g of a solid fuel in bomb calorimeter, the temperature of 3500 g of water increased from 26.5° c to 29.2° c. Water equivalent of calorimeter and latent heat of steam for 385 grams and 587cal/g respectively. If the fuel contains 0.77% H calculator HCV and NCV. 7M

**UNIT-V**

9. a) What is cement? How do you classify the cement? 7M  
b) How are lubricants classified? Give examples 7M

**OR**

10. a) Write a note on the composition of Portland cement 7M  
b) Explain the importance of refractories and their applications. 7M

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**R-15**

**Code: 5G121**

I B.Tech. II Semester Supplementary Examinations April 2023

## **C Programming and Data Structures**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks

### **UNIT-I**

1. a) What is a pointer? What are the features of pointers? Write a C program to print address of a variable 7M  
b) Write a C program to swap two numbers using pointers. 7M

**OR**

2. a) Using pointers write a C program which finds the maximum among the list of elements. 7M  
b) Explain in detail about Dynamic Memory allocation with examples 7M

### **UNIT-II**

3. a) Define union. List out the differences between unions and structures 7M  
b) Explain different modes to open a file 7M

**OR**

4. a) Describe the uses and limitations of getc and putc. 7M  
b) Write a program for sorting given numbers using selection sort technique 7M

### **UNIT-III**

5. Write a 'C' program for implementation of various operations on queue. 14M

**OR**

6. What is a stack? How it can be represented in "C" using arrays? 14M

### **UNIT-IV**

7. Represent a doubly linked list using an array. Write routines to insert and delete elements for this representation. 14M

**OR**

8. List the operations that can be performed on single linked list. In how many ways a node can be deleted from single linked list? Explain. 14M

### **UNIT-V**

9. a) Define and describe the terms: Tree, Binary Tree, Complete Binary Tree and Degree of a tree. 8M  
b) Define the following terms of graphs. i) Undirected graph ii) In degree iii) Digraph 6M

**OR**

10. a) Explain the operations on Binary Tree. 7M  
b) Define graph. Explain About the basic Terminology of graphs. 7M

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Important Note: 1. On completing your answers. Compulsorily draw diagonal cross line on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.