

**CIE 1**

***Question Papers***

## DEPARTMENT OF MATHEMATICS

**Sub Code:** MAE11

**Sub:** Advanced Calculus and Linear Algebra

**Test:** I

**Time:** 9.30 to 10.30 am

**Term:** 1.12.2022 to 10.03.2023

**Marks:** 30

**Date:** 19.01.2023

**Section:** Q, R, S, T, U, V

**Sem:** I

**Note:** Answer any TWO full questions. Each main question carries 15 marks

<b>Q. No.</b>	<b>Questions</b>		<b>Bloom's Level</b>	<b>CO's</b>	<b>Marks</b>
1. ✓ (a)	Define curvature and also write the expression for <u>radius of curvature</u> in parametric form.		L1	CO1	2
(b)	Find the length of perpendicular from pole to any point of the cardioid $r = a(1 + \cos\theta)$ .		L2	CO1	3
(c)	Find the values of $\lambda$ and $\mu$ such that the equations $2x + 3y + 5z = 9$ ; $7x + 3y - 2z = 8$ ; $2x + 3y + \lambda z = \mu$ have (i) no solution (ii) unique solution (iii) an infinite number of solutions.		L3	CO2	5
(d)	Find the radius of curvature of the curve $x^2 y = a(x^2 + y^2)$ at $(-2a, 2a)$ .		L4	CO1	5
2. (a)	Show that the matrix $A = \begin{bmatrix} 5 & -3 \\ 3 & -1 \end{bmatrix}$ is not diagonalizable.		L2	CO2	2
(b)	Does the system of linear equations $x + 2y + z = 4$ , $y - z = 1$ and $x + 3y = 0$ have at least one common point of intersection. Justify your answer.		L2	CO2	3
✓ (c)	Find the angle of intersection of $r = \frac{a}{1 + \cos\theta}$ & $r = \frac{b}{1 - \cos\theta}$ .		L3	CO1	5
✓ (d)	Use Gauss - Seidel method to solve the system of equations: $x + 5y + z = 3$ ; $2x + y + 4z = 27$ ; $6x + 2y - z = 4$ by taking $(1, 1, 1)$ as the initial approximation. Carry out 3 iterations.		L5	CO2	5
3. (a)	Prove that if $\lambda$ is an Eigenvalue of a matrix $A$ then $1/\lambda$ is an Eigenvalue of the inverse matrix $A^{-1}$ .		L1	CO2	2
(b)	Show that at any point $(r, \theta)$ , the tangent to the curve $r^n = a^n \sin(n\theta)$ makes an angle $(n+1)\theta$ with the initial line.		L2	CO1	3
(c)	Find the pedal equation of $r(1 - \cos\theta) = 2a$ and hence show that $\rho^2$ varies as $r^3$ for this curve.		L4	CO1	5
(d)	Solve using matrix method: $y_1' = y_1 + 3y_2$ ; $y_2' = 4y_1 + 5y_2$ ; $y_1(0) = 2$ , $y_2(0) = 1$ .		L5	CO2	5

*Ans*



**Internal Assessment Question Paper – 1**

**Ramaiah Institute of Technology**  
(Autonomous Institute, Affiliated to VTU)

**Department of Electronics & Communication Engineering**

Program: BE

Mobile phones are banned

Term: 31<sup>st</sup> November 2022-10<sup>th</sup> March 2023

CIE: 1

Max Marks: 30

Instructions to Candidates: Answer any two full questions

Course: Introduction to Cyber Security

Sem: I

Time: 12:30 pm-01:30 pm

Course Code: ETC146

Section: 1, 2, 3, 4 (M-V)

Date: 23/1/2023

Portions for Test: L1-L15

Sl No.	Question	Marks	Bloom's Level	CO	PO
Q1	a) Who are Cybercriminals? Explain the different categories of Cybercriminals. b) What are Botnets? What are they used for? Explain with a suitable example.	8	L2	CO1	3,6,8
Q2	a) Explain the following Cybercrime forms, with suitable example: i)Cyberdefamation ii)Web jacking iii)Identity Theft iv)Phishing b) What is social engineering? Explain the two types of social engineering.	8	L2	CO1	3,6,8
Q3	a) What is Cybercrime? List the different types of Cybercrimes and explain briefly the motives behind Cybercrimes. b) How criminals plan the attacks? Explain passive attacks and active attacks.	7	L2	CO1	3,6,8
		8	L2	CO2	3,6,8

**RAMAIAH INSTITUTE OF TECHNOLOGY**  
 (Autonomous Institute, Affiliated to VTU)  
**DEPARTMENT OF HUMANITIES**

**Programme: BE I Semester (Common for all branches)**

Term: 30/11/2022- 10/03/2023	Course: Professional Writing Skills in English	Course Code: HSCM15/HSC15
CIE: Test-1	Semester: I	Sec:M to V
Date: 21/01/2023	Time: 1Hour	Max Marks: 30
• <b>Portions for the test:</b> Unit-1 & 2		Credits: 1:0:0
• <b>Instructions:</b> Part-A (MCQ) is compulsory. Part-B: Answer <b>ANY TWO</b> full questions.		

Q. NO	QUESTIONS	Marks	Bloom's Level	Cos
<b>Part-A (MCQ Compulsory)</b>				
1.	<b>Choose the correct option for the following questions.</b>	[6X1=06]	Lo <sub>1</sub>	Co <sub>1-2</sub>
1.	The teacher _____ completed this chapter. (Choose the correct verb) A. have                    B. has                    C. is                    D. are			
2.	Ram and Shyam _____ business partners. (Choose the correct verb) A. have                    B. has                    C. are                    D. had			
3.	I bought an <b>expensive</b> dress at the mall (Identify the correct parts of speech for the underlined word) A. preposition            B. adjective            C. noun                    D. verb			
4.	2. What did <b>she</b> ask you to do? (Identify the correct parts of speech for the underlined word) A. conjunction            B. preposition            C. pronoun                    D. noun			
5.	I worked hard _____ I couldn't pass my exam (Fill in the blanks with the correct linkers or connectives) A. Thus                    B. While                    C. Although                    D. But			
6.	They were very friendly _____ I felt at home. (Fill in the blanks with the correct linkers or connectives) A. But                    B. While                    C. Because of                    D. And			
<b>Part-B</b>				
<b>Answer ANY TWO full questions for the following.</b>		[2X12=24]	Lo <sub>1</sub>	Co <sub>1-5</sub>
2. A.	Explain the principles of formal writing.	6	Lo <sub>2</sub>	Co <sub>1</sub>
B.	Write an essay on the topic "Science and technology in 21 <sup>st</sup> century". (Word limit-350)	6	Lo <sub>3</sub>	Co <sub>2</sub>
3. A.	<b>Rewrite the following sentences using the correct subject-verb agreement.</b>	6	Lo <sub>3</sub>	Co <sub>1</sub>
	1. Either Vikram or Anita have left the room unlocked. 2. One of the actors were seriously injured in the incident. 3. None of it really matter. 4. The boy who is moving with that group of students are my brother. 5. Quite a few singers finds it difficult to sing well to classical tunes. 6. The delegation consisting of thirty scholars are arriving tonight.			
B.	<b>Give the meaning and frame a sentence on each to differentiate the pair of words given below.</b>	6	Lo <sub>6</sub>	Co <sub>2</sub>
	1. Stationary/stationery                    2. Principal/principle                    3. Complement/Compliment			
4. A.	<b>Fill the blanks with suitable verb forms.</b>	6	Lo <sub>1</sub>	Co <sub>1</sub>
	1. A hundred and twenty kilometers an hour _____ (are/is) much too fast. 2. If I _____ an actress... (was/were). 3. The train _____ (leave) in ten minutes. 4. Did the postman _____ (come) this morning? 5. The teacher said that oil _____ (float) on water. 6. He _____ (run) faster than me yesterday.			
B.	<b>Condense (Precis) the following passage retaining the main idea and using a minim number of words.</b>	6	Lo <sub>3</sub>	Co <sub>2</sub>
Exercise in nature is very beneficial for both physical and mental health. In addition to the general benefits of exercise, such as improving cardiovascular health and increasing muscle strength, outdoor activities also provide an opportunity to experience the beauty and tranquillity of nature. It can increase feelings of well-being and reduce stress and anxiety. It is important to embrace the benefits of outdoor exercise and incorporate it into your regular routine. (141 words)				

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## **Department of Mechanical Engineering**

### **Internal Assessment Question paper - I**

**Programme:** BE

**Term:** December 2022 to March 2023

**Course:** Computer Aided Engg Drawing

**Course Code:** MELE18

**CIE:** Test 1    **Semester:** 1<sup>st</sup>    **Section:** Q

**Max Marks:** 30

**Time:** 2Hr

#### **Version-B**

**Instructions to Candidates:** i) Question 1 is compulsory and only sketching is required

ii) Answer any one question from Q2 or Q3 (both Sketch+ computer printout)

<b>Sl. No.</b>	<b>Question's</b>	<b>Marks</b>	<b>Course Outcome</b>
1	A hexagonal lamina of 25mm sides rest on edges touches both reference plane. The surface of the lamina is inclined $60^\circ$ to HP and $30^\circ$ to VP. Draw its projections	10	CO1
2	A pentagonal pyramid 25mm sides of base and 60mm axis length rests on HP on one its slant edges on HP. The axis of the <del>prism</del> is appeared to be inclined $45^\circ$ to VP. Draw its projections	20	CO2
3	A Cone of base diameter 40mm and 60mm height rest on hp on one its point on the circumference of the base. It is tilted in such a way that the apex is 40mm above HP and top view axis is inclined $45^\circ$ to VP so that the apex is away from the observer. Draw its projections and determine its inclination with HP	20	CO2

**MOBILE PHONES ARE BANNED**

**CIE – 1**

**Ramaiah Institute of Technology (*Autonomous Institute, Affiliated to VTU*)**

**Programme: B.E**

Sem: 1 <sup>st</sup>	Course: Design thinking	Course Code: AEPM17/ AECE17
CIE: Test 1	Term: 31.12.22 to 10.03.23	Sec: M,N,O,P,Q,R,S,T,U,V
Max Marks: 30	Duration: 1Hr	Time: 12.30 AM to 01.30 PM
Credit: 2:0:0	Test Portions: LP-01 to 10	Date: 19.01.2023

**Instructions to students:** Answer any two full questions out of the three given questions.

Sl#	Question	Marks	Bloom's Level	COs
1a	Frame Explorative, Affective, Reflective, Probing and Analytical questions to interview the target group of children aged between 12 and 15 towards use of gaming toys.	6	L3	CO2
1b	'Having a human centered mindset and being mindful of process help designers to use DT to its maximum potential.' Substantiate this statement with relevant explanation and examples.	6	L2	CO1
1c	What sort of research is necessary during empathy phase, and why?	3	L1	CO2
2a	You are given the task of conducting empathy interview for a group of new mothers regarding design of a baby cradle. Form two empathy questions for each block of the empathy map, and create an empathy map.	6	L3	CO2
2b	Define Design Thinking. List the phases of design thinking. Why is it called 'phases' of design thinking, instead of 'stages'?	6	L2	CO1
2c	List the key rules and principles to be followed by an interviewer.	3	L1	CO2
3a	Pottery industry of Majuli is characterized by small size of units, family based operation, use of traditional tools equipment, landless people and illiteracy among the artist. The survey reveals that the pottery industry in Majuli suffered lots of problems due to irregular supply and absence of raw materials, financial support, out dated tools and equipment, competition from the large scale sector, poor transport and lack of advertisement, absence of training workshop and lack of resource and development efforts. Promotion of pottery industry is essential for development of economic as well as cultural preservation. The intermediaries get good profits but they face the problem of getting the products damaged, demand dependent on the festive occasion, problem of transportation, etc. Study shows that there is a huge demand for Majuli pottery products in the international market. Buyers are willing to pay a premium for handmade goods, but the potters don't know how to initiate exports.  Write one problem statement based on the above observation, and change it into a 'How Might We' question.	6	L3	CO2
3b	Compare the design thinking approach for education and for business. Give suitable examples for both.	6	L2	CO1
3c	What are the three elements of a problem statement? Give an example.	3	L1	CO2

MOBILES AND SMART WATCHES ARE BANNED

RAMAIAH INSTITUTE OF TECHNOLOGY, BANGALORE - 560054

DEPARTMENT OF CHEMISTRY

SUB: ENGG. CHEMISTRY

CIE TEST - 1

Credits: 3:0:0

CODE: CYM12/CYE12

TERM: 30-11-2022 to 10-03-2023

COURSE: I SEM B.E.

MAX. MARKS: 30, TIME: 60 MIN.

Instructions: answer any two full questions. Each carries 15 marks

Q. NO	Question	Marks	Course outcomes
1	a) Give reasons: (i) In a concentration cell, no electricity flows when the concentration of metal ion is same in both the half cell. (ii) A salt bridge is used in the construction of a Galvanic cell. (iii) There is no self discharge in reserve batteries. <i>there is a separate component starud and incorporated into the battery when unit is necessary</i>	2+1+2	C01
	b) What is single electrode potential? A cell is constructed by coupling Zn-electrode dipped in 0.42 M $ZnSO_4$ and Ni-electrode dipped in 0.045 M $NiSO_4$ . Write the cell representation, over all cell reaction and calculate EMF of the cell at 298 K. Given: standard reduction potentials of Zn and Ni are -0.76 and -0.25 V respectively.	5	C01
	c) Explain the mechanism of <i>wet corrosion</i> of an iron rod by electrochemical theory.	5	C02

(PTO)

2	a) Derive the Nernst equation for the following electrode reaction: $Ag^+ + e^- \leftrightarrow Ag$	5	C01
	b) Calculate the potential of Ag-Cu cell at 25 °C, if the concentration of $Ag^+$ and $Cu^{2+}$ are 0.01 M and 0.008 M respectively. Standard reduction potential of Cu and silver electrodes are +0.34 and +0.8 volts respectively. Calculate the change in free energy $\Delta G$ for reduction of 1 mole of $Ag^+$ ions. 1 Faraday = 96.5 KJV <sup>-1</sup> mole <sup>-1</sup> .	3+2	C01
	c) Discuss the following factors which influence the rate of corrosion: (i) Nature and surface state of metal (ii) Temperature	3+2	C02
3	a) (i) How cathodic inhibitors reduce rate of corrosion? Name any 2 corrosion inhibitors used to inhibit the evolution of hydrogen gas at cathode. (ii) Justify: The corrosion product formed on aluminium is $Al_2O_3$ ; it is passive, whereas corrosion product formed on iron is $Fe_2O_3$ ; it is active.	2+3	C02
	b) Explain the construction and discharge reactions of Ni-MH <sub>2</sub> battery.	5	C01
	c) Write the details of construction and electrode reactions of calomel electrode with neat figure.	5	C01
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Term::31-12-2022 to 10-03-2023	Course: Constitution of India	Course Code:HSCE16
CIE: Test 1	Semester: I	Section: M to V
Max Marks: 30	Time: 1Hr	Date:20-01-2023

Portions for the test: unit-1 & unit-2

Instructions to Candidates: ANSWER THE FOLLOWING.

Sl#	Part-A	Marks	Bloom's Level	COs
I	Choose any one appropriate answer:	15	L1	Co1,Co2
1.	The right to live with human dignity is included in (a)The right to social justice (b)The right to equal protection of laws (c)The right to life (d)The right to freedom of religion			
2.	There are no express limitations imposed on the following article (a) Art 16. (b) Art 17. (c) Art 18. (d) Art 19.			
3.	Right to property has become an ordinary legal right through the (a) 42nd amendment-1976 (b) 12 <sup>th</sup> amendment -1960 (c) 44 <sup>th</sup> amendment -1978 (d) 86 <sup>th</sup> amendment -2002			
4.	<b>Ex-post-facto-law means</b> a) An out-dated law b) An invalid law c) Passing a criminal law with retrospective effect. d)A law applicable during emergency			
5.	Traffic in human beings has been prohibited under ----- group of fundamental rights. (a) Life and personal liberty. (b) Rights against exploitation (c) Social justice (d) Equal protection of laws.			
6.	Through which case Supreme Court held that "freedom of silence is a fundamental right guaranteed under article19(1)(a)" a) Murli Deora V. Union of India b) Unnikrishnan V, State of A.P c) T.M.A .Pai Foundation. State of Karnataka d) Bijoe Emmanuel V. State of Kerala			

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II	Part-B Answer any two full questions:			
1.	(a)Discuss the objectives of the Constitution enshrined in the preamble (b)Explain the right to equality from articles14-18 with exception. <i>Edar Oppo. No tto</i>	(06)	L2	Co1
2.	(a)Define salient features of Indian constitution. (b) Discuss the various aspects of right to freedom (article 19) and right to life & personal liberty (article 21).	(06) (06)	L2 L2	CO1, Co1
3.	(a)'Constitutional remedies (WRITS) are effective for the enforcement of Fundamental Rights'. Justify the statement. (b) "Fundamental duty under a democracy signifies the individual role" Elaborate the statement.	(06) (06)	L3 L3	Co1 Co2

## Programme: B E

### Internal Assessment – I

TERM : 30/11/2023 TO 10/03/2023	COURSE NAME : INTRODUCTION TO C PROGRAMMING
DATE : 23-01-23 TIME: 12.30 pm – 1.30 pm	COURSE CODE : ESC135
MAX MARKS: 30	PORTIONS : L1- L9



Mobile Phones are banned Instructions to Candidates: **Answer any TWO full questions.**

Q. NO	Questions	Blooms Levels (L1 to L6)*	CO	Marks
1.a	Differentiate while and do-while with flow chart and syntax.	L2	CO2	5
b	Consider the following code snippet and write the output	<p>10  <pre>#include&lt;stdio.h&gt; int main() {     int num1=3;     int num2 = 5;     printf("Value of expression = % -5d", num1 * 2 + num2 / 4);     printf("The value of ++num1 = %d", ++num1);     printf("The value of num1++ = %4d", num1--);     printf("The value of - -num = %d", num1==num2 );     printf("The value of num1 = %d", num1 &gt;&gt;2);     return 0; }</pre> <p>20      1000 , 3 = 8</p> </p>	<p>10  <pre>int main() {     int a, b;     a = 3;     b = 5;     a = a + b;     b = a - b;     a = b - a;     printf ("Value of a = %d", a);     printf ("Value of b = %d", b);     return 0; }</pre> </p>	CO1 5
c	Write a C program to swap two numbers without using a temporary variable.	L3	CO2	5
2.a	Explain the structure of C program with an example.	L2	CO1	5
b	Consider the below code snippet with errors. Write the executable code.	L4	CO2	5
	<pre>stdio.h #include&lt;stdio.h&gt; int main() {     float f1, f2;     int total;     printf ("Enter your floating point number1: ");     scanf ("%f", &amp;f1);     printf ("Enter your floating point number2: ")     scanf ("%f", &amp;f2);     total = f1 + f2;</pre>			



	printf ("%d The sum of %f and %f is %d",f1,f2,total); return 0; }			
c	Write a program to find whether the given year is a leap year.	L3	CO2	5
3.a	Differentiate between System Software and Application Software with an example.	L2	CO1	5
b	Rewrite the below Code using switch statement.  #include <stdio.h> int main() { char c; int lowercase_vowel, uppercase_vowel; printf("Enter an alphabet: "); scanf("%c", &c); lowercase_vowel = (c == 'a'    c == 'e'    c == 'i'    c == 'o'    c == 'u'); uppercase_vowel = (c == 'A'    c == 'E'    c == 'T'    c == 'O'    c == 'U'); if (lowercase_vowel    uppercase_vowel) printf("%c is a vowel.", c); else printf("%c is a consonant.", c); return 0; }	L3	CO2	5
c	Write a C program to find the greatest of three numbers using nested -if	L3	CO2	5

\* L1 – Remember, L2 – Understand, L3- Apply, L4- Analyze, L5-Evaluate, L6-Create

**CIE 2**

***Question Papers***



**DEPARTMENT OF MATHEMATICS**

**Sub Code:** MAE11

**Sub:** Advanced Calculus and  
Linear Algebra

**Test:** II

**Time:** 9.30 to 10.30 am

**Term:** 30.11.2022 to 21.03.2023

**Marks:** 30  
**Sem:** I

**Date:** 11.03.2023

**Section:** Q, R, S, T, U, V

Note: Answer any TWO full questions. Each main question carries 15 marks

Q.No.	Questions	Bloom's Level	CO's	Marks
1. (a)	If $u = \frac{x}{yz} + \frac{z}{xy}$ , what is the value of $xu_x + yu_y + zu_z$ ?	L1	CO1	2
(b)	Find the unit vector normal to the surface $xy^3 - 3yz^2 = 4$ at the point $(1, 2, 3)$	L2	CO1	3
(c)	If $u = x^2 - 3y^2$ ; $v = 3x^2 - y^2$ where $x = r\cos\theta$ , $y = r\sin\theta$ , then find $\frac{\partial(u, v)}{\partial(r, \theta)}$	L3	CO2	5
(d)	Show that the vector field defined by $\vec{F} = (y\sin z - \sin x)\hat{i} + (x\sin z + 2yz)\hat{j} + (xy\cos z + y^2)\hat{k}$ is irrotational. Find its scalar potential.	L4	CO1	5
2. (a)	With the help of a neat diagram mark the region of integration in the integral $\int_0^{1-x} \int_{1-x}^{1-x^2} dx dy$	L1	CO2	2
(b)	Find the area of the cardioid $r = 2(1 + \cos\theta)$ in the first quadrant.	L2	CO2	3
(c)	Evaluate the integral by changing the order of integration $\int_0^{1/2-y} \int_0^y xy dx dy$ .	L3	CO1	5
(d)	By using the transformation $x + y = u$ , $y = uv$ , show that $\int_0^{1-x} \int_0^{1-x} e^{\frac{y}{x+y}} dy dx = \frac{1}{2}(e-1)$ .	L5	CO2	5
3. (a)	Write the limits of integration with respect to $r$ and $\theta$ for the integral $\int_0^a \int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} f(x, y) dy dx$	L1	CO2	2
(b)	If $f = x^3 - y^3$ where $x = e^t \cos t$ ; $y = e^t \sin t$ , find $\frac{df}{dt}$ .	L2	CO1	3
(c)	Find the directional derivative of $\phi = xy^2 z^3$ along the direction of the normal to the surface $x^2 z + y^2 x + z^2 y = 3$ at the point $(1, 1, 1)$ .	L4	CO1	5
(d)	Using triple integral, find the volume of the ellipsoid: $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$	L5	CO2	5

Ramaiah Institute of Technology ( <i>Autonomous Institute, Affiliated to VTU</i> )		
Programme: B.E		CIE -2
Sem: 1 <sup>st</sup>	Course: Design thinking	Course Code: AECC17
CIE: Test 2	Term: 1.12.22 to 10.03.23	Sec: M,N,O,P,Q,R,S,T,U,V
Max Marks: 30	Duration: 1Hr	Time: 12.30 AM to 01.30 PM
Credit: 2:0:0	Test Portions: LP-11 to 22	Date: 11.03.2023

**Instructions to students:** Answer any two full questions out of the three given questions.

Sl#	Question	Marks	Bloom's Level	COs
1a	Explain Chi's three rules for prototyping.	6	L2	CO3
1b	Explain how functional analysis of a pencil is done in value engineering job plan	6	L3	CO4
1c	What are the guidelines considered while testing with end users?	3	L2	CO4
2a	Through IDEO shopping cart challenge, explain the principles one could learn pertaining to ideation phase?	6	L2	CO3
2b	What are the sales, profits, and marketing objectives at different product life-cycle phases?	6	L2	CO4
2c	What three tests would you perform for testing a technology that gives 3D printed casts for broken bones?	3	L3	CO4
3a	Sulekha has given an idea of reducing wastage due to disposable coffee cups in offices by asking employees to bring their own ceramic cups instead. Can you give four examples of building by 'plus'ing on the idea of Sulekha? Also, explain how this mindset is useful during ideation phase	6	L3	CO3
3b	Why is testing phase important? Name and explain any three types of tests.	6	L2	CO4
3c	Draw the product life-cycle, showing the trends for sales and profits for each phase clearly.	3	L2	CO4

**RIT, Department of Electronics & Communication Engineering**  
**Course: Introduction to Cyber Security Code: ETC146 Sem: I Max Marks: 30 Duration: 1Hr Date: 15/3/2023**  
**Instructions to Candidates: Answer any 2 full questions**      **Mobile Phones are banned**

Sl No.	Question	Marks	Bloom's Level	CO
Q1	a) What are Proxy servers and Anonymizers? Explain the uses of Proxy servers.	5	L2	CO3
	b) Explain the following types of Identity thefts: i) Identity Cloning    ii) Medical Identity theft    iii) Criminal Identity theft	6	L2	CO4
	c) Describe the digital forensics process.	4	L2	CO5
Q2	a) Explain the following terms related to Password Cracking: i) Shoulder Surfing    ii) Man-in-the-middle attack    iii) Dumpster Diving	6	L2	CO3
	b) What is whaling? Explain Dragnet and Lobsterpot methods of Phishing.	5	L2	CO4
	c) Explain the data seen using forensic tools.	4	L2	CO5
Q3	b) Explain any two types of computer viruses and mention two differences between virus and worms.	6	L2	CO3
	b) What are Hoax E-mails? Explain two types of Phishing scams.	5	L2	CO4
	c) Describe the term digital forensics science. What are the various phases in computer forensics?	4	L2	CO5

**RAMAIAH INSTITUTE OF TECHNOLOGY, BANGALORE-560054**  
**DEPARTMENT OF CHEMISTRY**

Sub: Engineering Chemistry, Code: CYE12, Course: I Sem B E (EEE stream)  
 CIE Test: 2, Term : 30.11.2022 to 21.03.2023 Max. Marks: 30 Time : 60 min, Credit: 3:0:0  
Instructions: Answer any two full questions. Each question carries 15 marks

Q.No.		Marks	CO's
1	a) Define glass transition temperature? Explain any two factors affecting Tg of polymers?	5	CO3
	b) Define the term liquid crystal. Discuss Classification of liquid crystals with suitable examples.	5	CO3
	c) Explain the synthesis of nanomaterials by solution combustion method with suitable example.	5	CO4
2	a) Write the synthesis, properties and applications of Teflon.	5	CO3
	b) What is a homologous series? Describe the liquid crystalline behaviour in homologous series compound by taking an example of PAA.	5	CO3
	c) State Beer-Lambert's law. Explain the instrumentation of colorimeter.	5	CO4
3	a) Give reasons: i) Teflon coated utensils are used for cooking or baking. ii) All simple organic polymers are not monomers. iii) Plexi glass is used in the manufacture of lenses.	5	CO3
	b) Describe the determination of the pH of beverages using Glass electrode.	5	CO4
	c) What are nanomaterials and give examples. Outline any four applications of nanomaterials.	5	CO4

<b>Term: 30.11.22 – 10.03.23</b>	<b>Course: Professional Writing Skills in English</b>	<b>Course Code: HSCC15</b>
<b>CIE: Test-II</b>	<b>Semester: I</b>	<b>Sec:M to V</b>
<b>Max Marks: 30</b>	<b>Time: 1 Hour</b>	<b>Date: 14.03.23</b>
<b>Portions for the test: Unit: 3, 4, &amp; 5</b>		<b>Credits: 1:0:0</b>

**Instructions to Candidates:** Section 1 is compulsory, answer any two full from section 2

**Section 1**  
**Objective type Questions**

<b>Q. No.</b>		<b>Ma rks</b>	<b>Blo o m's Level</b>	<b>Co ns</b>

<b>Answer any 6 questions out of 8 questions (Write the question number and the answer option fully)</b> <p><b>I. A report writing related to the status of work activity, known as:</b>            a. Trip report    b. Incident report            c. Progress report    d. Exclusive report</p> <p><b>II. What would be the most helpful in a job search?</b>            a. Developing networking    b. Checking professional affiliations            c. Browsing on the internet    d. Submitting CV to recruitment agencies</p> <p><b>III. Which of these types of listening lacks depth?</b>            a. Appreciative listening    b. Superficial Listening            c. Focused listening    d. Critical listening</p> <p><b>IV. Which of the following is NOT a necessary part of a resume?</b>            a. Religion    b. Education            c. Contact information     d. Employment history</p> <p><b>V. Which of the following is NOT a component of reading skills?</b>            a. Laying implicit and explicit information                b. Recognition of letters            c. Recognizing the relationship between                    d. Getting the meaning of unfamiliar words and among sentences</p> <p><b>VI. Which of these is NOT a step in the listening process?</b>            a. To stop talking    b. Receiving            c. Misinterpreting    d. Responding</p> <p><b>VII. The group discussion evaluates the candidate's ability to...</b>            a. Argue with others    b. Control others            c. lead others    d. Confer with others on a given subject</p> <p><b>VIII. The relationship between the people who are communicating relates to...</b>            a. Socio-psychological dimension                                b. Cultural dimension            c. Physical dimension    d. Temporal dimension</p>				
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	<b>Section 2</b> <b>Answer any two full questions (2X12=24)</b>			
2.A	<b>Report/Narrate the following conversation in a paragraph</b> Jay - Hello? Am I talking to Prateek Agarwal? Prateek - Hello. Yes, I am Prateek Agarwal. May I ask who is speaking? Jay - Prateek, it is me Jay Roy from college. Remember? Prateek - Hey Jay, how are you? It has been such a long time. Jay - I am doing good. Yes, four long years after college. I got your contact number from Piyush. You remember him, right? Prateek - Yes, yes, I do remember him. Wasn't he the one who topped our engineering batch last year?	6	L3	3
B.	<b>Fill in the blanks with passive-form verbs</b> There was a time when the water of the Ganga ..... (consider) so pure that people stored it in sealed containers. Today the water of this very same river ..... (pollute) and is no longer safe for drinking purpose. Holi ..... (celebrate) for two to five days. On the first day, large fires ..... (light) everywhere and people worship them to mark the end of evil in the land. If we pile up all the rubbish that ..... (throw) out by people all over the world, we can easily build one Mount Everest every year. Half this waste ..... (make) up of mineral and industrial wastes.	6	L2	3
3.A	Why listening comprehension is important in communication? List out the barriers to listening and suggest suitable ways to overcome the barriers.	6	L3	4
B	Draft a job application letter with a suitable resume for the post of "Design Engineer" (Talent Management, Global Technologies, Bengaluru). Assume the necessary information.	6	L6	4
4.A	Body language can show you are energetic in a group discussion. Justify your answer.	6	L3	5
B	Describe a time when you had problems with your friends and had to communicate your unhappy feelings or difficult disagreements. Write what you did and what happened.	6	L3	5



**Programme: B E**

**Internal Assessment – II**

TERM : 30/11/2023 TO 21/03/2023	COURSE NAME : INTRODUCTION TO C PROGRAMMING
DATE : 15-03-23 TIME: 9.30am – 10.30am	COURSE CODE : ESC135
MAX MARKS: 30	PORTIONS : L13- L23



Mobile Phones are banned Instructions to Candidates: **Answer any TWO full questions.**

Q. NO	Questions	Blooms Levels (L1 to L6)*	CO	Marks
1	Define Recursion. Write a C Program to find the factorial of a given number using a recursive function.	L3	CO3	5
b.	<p>I. Identify errors, if any in each of the following:</p> <p>a. char word [8] = { 'A', 'R', 'R', 'A', 'Y' };</p> <p>b. void abc (int a[5])</p> <pre>{     int c;     .....     .....     return (c ); }</pre> <p>II. List the inbuilt string handling function for comparing two strings. Illustrate the syntax with an example.</p>	L3	CO4	5
c.	What is a pointer? Illustrate with example, how to define and declare a pointer.	L2	CO5	5
2	List the elements of the function definition and explain the general format of a function.	L2	CO3	5
b.	Write a C program to perform a binary search for any key for a set of elements stored in a 1D array.	L3	CO4	5
	Write a C program to find the sum of elements of an array using pointers.	L3	CO5	5
3.	<p>Illustrate the following with the below code.</p> <ol style="list-style-type: none"> <li>Rewrite the following code using functions with <b>no arguments and with return value</b> for the given program.</li> <li>Name the function that can be categorized into the calling function and the called function?</li> </ol>	L2	CO3	5

3. List local and global variables.

```
#include<stdio.h>

int num;

void main()
{
    int numc, rev=0, rem;
    printf("Enter the number");
    scanf("%d", &num);
    numc = num;
    while (num != 0)
    {
        rem = num % 10;
        rev = (rev * 10) + rem;
        num = num / 10;
    }
    if (numc == rev)
        printf("%d is a palindrome", numc);
    else
        printf("%d is not a palindrome", numc);
}
```

~~b~~ List the different ways how a 2 Dimensional array can be initialized. and differentiate between arrays and structures.

L2 CO4 5

~~c~~ Write a C program to swap two integers using a call by reference method of passing arguments to a function.,

L3 CO5 5

\* **L1** – Remember, **L2** – Understand, **L3**- Apply, **L4**- Analyze, **L5**-Evaluate, **L6**-Create

**Ramaiah Institute of Technology**  
 (Autonomous Institute, Affiliated to VTU)  
 Department of HUMANITIES. Programme: BE

Term: 31-12-2023 to 21-03-2023	Course: Constitution of India	Course Code: HSCC 16					
CIE: Test II	Semester: I	Sec: M to V					
Max Marks: 30	Time: 1Hr	Date: 13 -03-2023					
<b>Portions for the test: unit- 3 ,4 and 5</b>							
<b>Instructions to the candidates: Answer the following.</b>							
Sl #	Questions	Marks	Bloom's Level	COs			
I	Choose any one appropriate answer.	6	L1	CO3, CO4, CO5			
1	Which legislative house cannot be dissolved or abolished? a) Legislative assembly b) Legislative Council c) Lok Sabha d) Rajya Sabha.						
2	A law enacted by the President during the absence of parliamentary sessions is known as a) By law b) Ordinance c) Order d) Statute.						
3	Who is the Ex- officio Chairman of Rajya Sabha ? a) Prime Minister b) President c) Vice- President d) Speaker.						
4	The power of Supreme Court to strike down a law that is inconsistent with the fundamental rights is known as a) Judicial activism b) Original jurisdiction c) Judicial review d) Epistolary jurisdiction.						
5	Through which amendment did Panchayats receive constitutional status? a) 73 <sup>rd</sup> b) 86 <sup>th</sup> c) 61 <sup>st</sup> d) 103 <sup>rd</sup> .						
6	✓ The maximum duration of state emergency is a) 2 years b) 3 years c) 5 years d) 6 years.						

II		Answer any two full questions.			
Q1	a)	Discuss the constitutional position, powers and functions of President of India.	(6)	L1	CO3
	b)	Explain the grounds and effects of national emergency and state emergency.	(6)	L2	CO4
Q2	a)	Explain the composition and functions of election commission.	(6)	L2	CO5
	b)	Identify the various jurisdictions of Supreme Court of India.	(6)	L3	CO3
Q3	a)	'Indian Constitution is partly flexible and partly rigid in terms of amendment'. Analyze the statement. Write a note on the changes brought through 42 <sup>nd</sup> amendment.	(6)	L4	CO4
	b)	Explain the composition and powers of union legislature.	(6)	L2	CO3

***Sem end  
Question Papers***

# SEMESTER END EXAMINATIONS - MAY 2023

Program : B.E :- Common to ECE / EEE / EIE / ETE / MLE  
Course Name : Engineering Chemistry  
Course Code : CYE12

Semester : I  
Max. Marks : 100  
Duration : 3 Hrs

## Instructions to the Candidates:

- Answer one full question from each unit.

### UNIT - I

1. a) What is single electrode potential? Derive Nernst equation for single electrode potential. CO1 (08)  
b) Describe the construction, working and any two applications of Lithium ion battery. CO1 (06)  
c) Define concentration cell. Represent the cell formed by the coupling of two zinc electrodes immersed in zinc sulphate solutions. If two Zn electrodes were in contact with Zn ions, emf of the cell was found to be 0.065V. If concentration of solution at cathode is 0.1M, calculate concentration of other solution. CO1 (06)
2. a) Outline the following characteristics of battery:  
(i) Capacity (ii) Energy density (iii) Voltage. CO1 (08)  
b) Describe the construction and working of Ni-MH battery with relevant reactions during discharge. CO1 (06)  
c) Define single electrode potential. When a Cu electrode is kept in contact with its solution at 25°C, electrode potential is found to be 0.345V. Calculate concentration of solution. (Given  $E^{\circ}_{Cu} = 0.33V$ ) CO1 (06)

### UNIT - II

3. a) When Fe is exposed to moist environment undergoes corrosion leading to the formation of rust. Explain the electro chemical theory of mechanism of corrosion by considering all the possible types of corrosion environments. Write the chemical formula of rust. CO2 (08)  
b) Illustrate the type of corrosion that occurs when (i) Steel pipe is connected to copper plumbing (ii) Presence of small dust particle on iron surface for long time CO2 (06)  
c) What is cathodic protection? Explain sacrificial anodic method of corrosion control. Write an example where this method is employed. CO2 (06)
4. a) What is anodizing? Outline the process involved in anodizing of aluminium article. CO2 (08)  
b) How the following factors affect rate of corrosion.  
(i) Nature of corrosion product (ii) pH of the medium (iii) Relative anode and cathodic area. CO2 (06)  
c) Illustrate differential aeration corrosion with an example. CO2 (06)

### UNIT - III

5. a) Outline the principle, construction and working of organic light emitting diodes with a neat diagram. CO3 (08)  
b) Discuss the classification of liquid crystals with suitable examples. CO3 (06)  
c) Describe the synthesis of Teflon and list any two properties and applications. CO3 (06)

# **CYE12**

6. a) Define conducting polymers. Explain the mechanism of conduction in CO3 (08)  
polyacetylene.  
b) Define Glass transition temperature. Describe how intermolecular forces CO3 (06)  
and flexibility affects glass transition temperature.  
c) Describe liquid crystalline behavior in PAA series. CO3 (06)

## **UNIT- IV**

7. a) Account for the following: CO4 (08)  
(i) While estimating Fe by potentiometric sensor, there is sudden jump in the potential at one point.  
(ii) Estimation of Cu by colorimetry requires 610 nm light for measuring absorbance  
(iii) Nanomaterials are preferred as catalysts rather than bulk counterparts.  
b) How are nanomaterials prepared by Hydrothermal synthesis method? CO4 (06)  
c) What are Ion selective electrode? How pH is determined using ion CO4 (06)  
selective electrode?
8. a) What is the principle of Potentiometric sensors? How iron is determined CO4 (08)  
by using potentiometric sensors?  
b) (i) What are nanomaterials? CO4 (06)  
(ii) List the techniques used for nanomaterials characterization.  
(iii) Give any three applications of nanomaterials in various fields?  
c) What is principal of colorimetry? Give procedure to estimate Cu by CO4 (06)  
colorimetry.

## **UNIT - V**

9. a) What are fuel cells? Explain with neat labeled diagram the working of CO5 (08)  
Methanol-oxygen fuel cell.  
b) What are the sources and types of E waste? Give the major constituents CO5 (06)  
of E waste.  
c) Explain polymer electrolyte fuel (PEF) cells. Give any two differences CO5 (06)  
between Methanol-O<sub>2</sub> and PEF.
10. a) Explain the detailed procedure for the extraction of gold from E-waste. CO5 (08)  
List any three advantages of E waste recycling?  
b) What is photo voltaic cells? Give the working mechanism of PV cells. CO5 (06)  
c) Give elaborative discussion on 'effect of E-waste on human health and CO5 (06)  
environment'.

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# SEMESTER END EXAMINATIONS – MAY 2023

Program : B.E. – Common to all Programs  
Course Name : Introduction to C Programming  
Course Code : ESC135

Semester : I  
Max. Marks : 100  
Duration : 3 Hrs

## Instructions to the Candidates:

- Answer one full question from each unit.

### UNIT - I

1. a) Differentiate between variable and a constant. Discuss the rules to be followed while declaring a valid variable. CO1 (06)  
b) Determine the output of the following code snippet. CO1 (08)

```
int main()
{
    printf("欢迎 to MSRIT!");
    printf("欢迎 to MSRIT!");
    printf("Welcome to MSRIT!");
    return 0;
}
```

- c) Write a program to calculate the salary of an employee, given his basic pay (to be entered by user), HRA = 10% of the basic pay, TA = 5% of basic pay. CO1 (06)

Define HRA and TA as symbolic constants and calculate the salary of the employee. [Salary = Basic Pay + HRA + TA].

2. a) What do you mean by a data type? List and discuss any four data types supported in C language. CO1 (06)  
b) Explain various logical, relational and arithmetic operators with example. CO1 (08)  
c) Write a program to identify whether the given character is an alphabet, digit, whitespace or punctuation using 'simple if'. CO1 (06)

### UNIT - II

3. a) Write a C program to generate even and odd numbers within a given range. (Using for loop). CO2 (06)  
b) Give a syntax for If-else-If statement. Write a program for the same. CO2 (08)  
c) Define with an example: i) nested Loops ii) Dangling Else problem. CO2 (06)

4. a) Write a C program to find whether the given triangle is equilateral, CO2 (06)  
Isosceles or scalene.  
b) Draw the flowchart and syntax of the switch statement. CO2 (06)  
c) How many types of iterative statements are there? List and explain any CO2 (08)  
two in detail with an example.

**UNIT - III**

5. a) With appropriate examples explain compile and runtime initialization of CO3 (06)  
one dimensional arrays.  
b) Write a C program using functions to swap two integer values using call CO3 (07)  
by reference.  
c) Write a C program to read a number. Find whether it is a prime number CO3 (07)  
or not using functions.
6. a) Explain with an example the two ways in which arguments /parameters CO3 (06)  
can be passed to the called function.  
b) Write a C program to find the factorial of a given number using CO3 (07)  
recursion.  
c) Write a C program to print the square and cube, of index and element of CO3 (07)  
1-D array.

**UNIT- IV**

7. a) Write a C program to print the sum of the diagonal elements in a given CO4 (08)  
matrix.  
b) Given a sorted array array\_1[] of n elements, write a program to search CO4 (06)  
for a given elements.  
c) What is an array? Explain the compile and runtime initialization of a 2-D CO4 (06)  
array.
8. a) Write a C program to find the transpose of a given matrix. CO4 (06)  
b) Write a C program to pass an array to a function that returns the CO4 (08)  
minimum element in the given array.  
c) Write a C program to read and print a 3 x 3 matrix. CO4 (06)

**UNIT - V**

9. a) Write a C program to concatenate two given strings without using built- CO5 (06)  
in function.  
b) Write a C program using array of structures to read and print the name, CO5 (10)  
register number, three subject marks and average of those three  
subjects of 5 students.  
c) Define Pointers. List the benefits of pointers. CO5 (04)
10. a) Write a C program to reverse the given string without using the built-in CO5 (06)  
function.  
b) Compare structure and arrays. Discuss how to declare & initialize the CO5 (06)  
members of structures with suitable examples.  
c) Explain with syntax and example, any four built-in string handling CO5 (08)  
functions.

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**SEMESTER END EXAMINATIONS - MAY 2023**

<b>Program</b>	<b>B.E :- Common to ECE / EEE / EIE / ETE / MLE / ME / IM / CH</b>	<b>Semester</b>	<b>I</b>
<b>Course Name</b>	<b>Professional Writing Skills in English</b>	<b>Max. Marks</b>	<b>50</b>
<b>Course Code</b>	<b>HSCC15</b>	<b>Duration</b>	<b>2 Hrs</b>

### **Instructions to the Candidates:**

- PART – A** : Answer all the questions, each question carries one mark.
  - PART – B** : Answer one full question from each unit.

## PART-A

CO1 - (10)  
CO5

**PART- B**  
**UNIT- I**

1. Use the given phrasal verbs in your own sentences. CO1 (08)
- i. Come across      ii. Figure out      iii. Back out      iv. Drop in  
 v. Bank on      vi. Run out of      vii. Dish out      viii. Get rid of
2. Rewrite the following sentences using appropriate subject-verb agreement. CO1 (08)
- i. The postman has came already.  
 ii. He was mop the house with an old rag.  
 iii. All the books is belonging to me.  
 iv. I saw Jack with that strange woman many times.  
 v. Laugh is the best medicine.  
 vi. He is a honest man.  
 vii. He called me on 12 o'clock  
 viii. The sweets was distributed among the children.

**UNIT- II**

3. a) Explain the principles of formal writing. CO2 (04)  
 b) Re-write the following passage with correct punctuation. CO2 (04)
- what would you like to eat asked Danielle, as she searched through the cupboards idon't know said Karen what have you got Well there s pasta, rice and various sauces said danielle do you fancy Italian or Chinese chinese I think ok then what can we have with it? I think there s some salad in the fridge. That ll be fine
4. Write an argumentative essay for or against the proposition on the following topic: CO2 (08)

**Is social media killing communication?**

5. a) Discuss the salient features of technical writing. CO3 (04)  
 b) What is a report? What are its types? CO3 (04)
6. a) MMD College, Nashik, recently organized a science symposium on the topic: 'Effect of pollution on quality of life'. You are Amit/Amita, editor of the school magazine. Write a report on the event for your college magazine. CO3 (04)  
 b) Rewrite the conversation to narrative form/reported speech. CO3 (04)
- Bobby: Hi Jason, it's great to see you again.  
 Jaison: Wow, it's great seeing you, how long has it been? It must be more than 6 months. I'm doing well. How about you?  
 Bobby: Not too bad.  
 Jaison: What movie are you and the family going to watch?  
 Bobby: I came here to watch the Simpsons movie. How about you?  
 Jaison: I'm going to watch a film today.

# **HSCC15**

7. a) Have you ever asked someone to express their viewpoint before expressing your own? Substantiate your answer with suitable examples to overcome the barriers to listening skills. **UNIT- IV** CO4 (04)
- b) **Read the following passage and answer the following question given below:** CO4 (04)
- Women have been subjected to injustice since ages. Some people feel that the birth of a girl child may lower their status in society. There is an extreme desire for boy-child among some sections of our society. Women need to be empowered. A woman has every right to give birth to a baby. The girl child is a blessing of God. Just give her a chance, and she will make you proud with her achievements.
- How women and men be made aware of their responsibilities to promote and practice gender equality?
8. Apply for the post of Software developer in any company of your choice along with a suitable resume. Assume the necessary information. CO4 (08)

9. a) What do you understand by Interpersonal skills at the workplace? CO5 (04)
- b) Explain the dos and don'ts of group discussion. CO5 (04)
10. a) How important are interpersonal skills in the workplace? Infer your views. CO5 (04)
- b) Required 'technical support engineers'. Write an application with CV to Antex Software Solutions, 404, B-1, 17 9th Floor, Mahatma Gandhi Road, Bengaluru-560001. CO5 (04)

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# SEMESTER END EXAMINATIONS - MAY 2023

Program	: B.E :- Common to ECE / EEE / EIE / ETE / MLE	Semester : I
Course Name	: Advanced Calculus and Linear	Max. Marks : 100
Course Code	: MAE11	Duration : 3 Hrs

**Instructions to the Candidates:**

- \* Answer one full question from each unit.

**UNIT - I**

1. a) Write the formula for the radius of curvature of the curve in parametric form and explain the terms involved in it. CO1 (02)
- b) Find the pedal equation of the curve  $r = a + b \cos \theta$ . CO1 (04)
- c) Show that the curves  $r^2 = a^2 \cos 2\theta$  &  $r = a(1 + \cos \theta)$  intersect at angle  $\frac{3\pi}{4}$ . CO1 (07)
- d) Show that the radius of curvature of the curve  $x^2y = a(x^2 + y^2)$  at  $(-2a, 2a)$  is  $2a$ . CO1 (07)
  
2. a) Write the formula for the derivative of arc length in parametric form. CO1 (02)
- b) Find the slope of the tangent to the curve  $r \sec^2\left(\frac{\theta}{2}\right) = 4$  at  $\theta = \frac{\pi}{2}$ . CO1 (04)
- c) Show that the radius of curvature of the curve  $r^n = a^n \cos n\theta$  varies inversely as  $r^{n-1}$ . CO1 (07)
- d) Show that the pedal equation of the curve  $r^n = a^n \sin n\theta + b^n \cos n\theta$  is  $p^2(a^{2n} + b^{2n}) = r^{2n+2}$ . CO1 (07)

**UNIT - II**

3. a) Define row echelon form of a matrix  $A$ . CO2 (02)
- b) Use Rayleigh's power method to find the largest eigenvalue and the corresponding eigenvector of the matrix  $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$  by taking  $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$  as

the initial approximation to the eigenvector. Carry out two iterations.

- c) Apply Gauss elimination method to solve the following system of equations  $x + y + z = 9$ ,  $x - 2y + 3z = 8$ ,  $2x + y - z = 3$ . CO2 (07)
- d) Diagonalize the matrix  $A = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$  and hence find  $A^5$ . CO2 (07)

# MAE 11

4. a) Explain the geometrical interpretation of no solution for the system of linear equations  $x+3y=4$  and  $2x+6y=6$ . CO2 (02)
- b) Find the value of  $\lambda$  for which the system of equations  $x+2y+3z=14$ ,  $x+4y+7z=30$ ,  $x+y+z=\lambda$  are consistent. CO2 (04)
- c) Use Gauss - Seidel method to solve  $5x-y=9$ ;  $x-5y+z=4$ ,  $y-5z=6$ , by taking  $(0,0,0)$  as an initial approximation. Carry out three iterations. CO2 (07)
- d) Solve the following system of linear differential equations using matrix method  $x'_1 = 3x_1$ ,  $x'_2 = x_1 + x_2$  given  $x_1(0)=1$ ,  $x_2(1)=-1$ . CO2 (07)

### UNIT - III

5. a) Define: (i) solenoid vector (ii) irrotational vector. CO3 (02)
- b) The altitude of a right circular cone is 15cm and it is increasing at 0.2cm/sec. The radius of the base is 10cm and it is decreasing at 0.3cm/sec. How fast is the volume changing? CO3 (04)
- c) If  $u = \operatorname{cosec}^{-1} \left[ \frac{x^{\frac{1}{2}} + y^{\frac{1}{2}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}} \right]$  then find i)  $xu_x + yu_y$ , ii)  $x^2u_{xx} + 2xyu_{xy} + y^2u_{yy}$  CO3 (07)
- d) Find  $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ , where  $u = x^2 + y^2 + z^2$ ,  $v = xy + yz + zx$ ,  $w = x + y + z$  and also find the functional relation between  $u, v$  and  $w$ . CO3 (07)
6. a) For  $u = \sin(x - ct)$  then find  $u_{tt}$ . CO3 (02)
- b) Find the directional derivative of  $u(x, y, z) = xy^2 + yz^3$  at the point  $(2, -1, 1)$  in the direction of the vector  $\hat{i} + 2\hat{j} + 3\hat{k}$ . CO3 (04)
- c) Show that  $\vec{F} = (\sin z + y)\hat{i} + x\hat{j} + x \cos z \hat{k}$  is irrotational. Also find a scalar function  $\phi$  such that  $\vec{F} = \nabla\phi$ . CO3 (07)
- d) If  $F$  is a function of  $x, y, z$  and  $x = u + v + w$ ,  $y = uv + wu + vw$ ,  $z = uvw$  then show that  $uF_u + vF_v + wF_w = xF_x + 2yF_y + 3zF_z$ . CO3 (07)

### UNIT- IV

7. a) With a help of neat diagram mark the region of integration in the integral  $\int_0^1 \int_{1-x}^{1-x^2} dx dy$ . CO4 (02)
- b) Evaluate  $\int_0^1 \int_0^2 \int_0^2 x^2 yz dx dy dz$ . CO4 (04)
- c) Evaluate the following integral by changing to polar coordinates  $\int_0^a \int_{\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} \frac{xy}{x^2 + y^2} e^{-(x^2+y^2)} dy dx$ . CO4 (07)
- d) Find the volume of the sphere  $x^2 + y^2 + z^2 = a^2$  by changing to spherical polar coordinates. CO4 (07)

# MAE 11

8. a) With the help of a neat diagram mark the region of integration in CO4 (02)
- $$\int_0^{\pi/2} \int_0^{\infty} f(r, \theta) dr d\theta.$$
- b) Evaluate  $\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y} dy dx$  by changing the order of integration. CO4 (04)
- (c) Evaluate  $\iiint_R (x + y + z) dx dy dz$  where  $R$  is the region bounded by CO4 (07)  
 $z = 0, y = 0, x = 0$  and  $x + y + z = 1$ .
- d) Find the area lying inside the cardioid  $r = a(1 + \cos\theta)$  and outside the circle  $r = a$ . CO4 (07)

## UNIT - V

9. a) State Stokes theorem. CO5 (02)
- b) If  $\bar{F} = (3x^2 + 6y)\hat{i} - 14yz\hat{j} + 20xz^2\hat{k}$  then evaluate  $\int_c \bar{F} \cdot d\bar{r}$  along the CO5 (04)  
 straight line  $c$  from  $(0, 0, 0)$  to  $(2, 1, 3)$ .
- c) State and prove Greens theorem in a plane. CO5 (07)
- d) Evaluate  $\int_s \bar{F} \cdot \hat{n} ds$ , where  $\bar{F} = 4x\hat{i} - 2y^2\hat{j} + z^3\hat{k}$  and  $S$  is the surface CO5 (07)  
 bounded by  $x^2 + y^2 = 25$  and the planes  $z = 0$  and  $z = 6$  using Gauss divergence theorem.
10. a) Define line integral of a vector function and give its physical interpretation. CO5 (02)
- b) If  $\bar{F}$  is irrotational then show that  $\int_c \bar{F} \cdot d\bar{r} = 0$  for any closed curve  $c$ . CO5 (04)
- c) Verify Green's theorem for  $\int_c (x^2 - y^2) dx + 2xy dy$ , where  $c$  is the rectangle CO5 (07)  
 bounded by  $y = 0, x = 0, y = b$  and  $x = a$ .
- d) Evaluate  $\int_c \bar{F} \cdot d\bar{r}$ , where  $\bar{F} = (2x - y)\hat{i} - yz^2\hat{j} - y^2 z\hat{k}$  and  $c$  is the CO5 (07)  
 boundary of the upper half of the sphere  $x^2 + y^2 + z^2 = 1$  using Stoke's theorem.

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