



# Swami Keshvanand Institute of Technology, Management & Gramothan

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Affiliated to Rajasthan Technical University, Kota

## Midterm Paper, Solution, BL-CO Mapping & Attainment (**Sample**)

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Swami Keshvanand Institute of Technology,  
Management & Gramothan, Jaipur  
I Mid Term Examination, September-2022

Semester:	III	Branch:	ME, EC, CE
Subject:	AEM-I	Subject Code:	3ME2-01, 3EC2-01, 3CE2-01
Time:	1.5 Hours	Maximum Marks:20	
Session (I/II/III): II			

PART A (short-answer type questions)

(All questions are compulsory) (3\*2=6)

Q.1 State Fundamental Theorem of Finite Difference Calculus.

Q.2 Write the formulae of Simpson 1/3 rule and Simpson 3/8 Rule.

Q.3 Find the approximate value of the real root of the equation

$$x^3 - 3x + 4 = 0, \text{ using the method of false position.}$$

PART B (Analytical/Problem solving questions)

(Attempt any 2 Questions) (2\*4=8)

Q.4 From the following table find the number of students who obtained

(a) Less than 45 marks (b) More than 45 marks

Marks obtained	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

Q.5 Evaluate  $\int_4^{5.2} \log_e x dx$ , by Trapezoidal Rule.

Q.6 Given  $\frac{dy}{dx} = 1 + xy$  with initial condition that  $y = 1$  at  $x = 0$ ,

Compute  $y(0.1)$  Correct to four places of decimal by using Taylor Series Method.

PART C (Descriptive/Analytical/Problem solving/Design questions)  
(Attempt any 1 Question) (1\*6=6)

Q.7 Evaluate  $\frac{dy}{dx}$  at  $x = 0.1$  and  $x = 0.5$  from the following data-

x	0	0.1	0.2	0.3	0.4	0.5	0.6
f(x)	30.28	31.43	32.98	33.54	33.97	33.48	32.13

Q.8 Use Runge Kutta method to solve  $\frac{dy}{dx} = x + y$ ,  $x_0 = 1, y_0 = 0$

for  $x=1.1$  with  $h = 0.1$



**Solution of Question Paper**

I Mid-Term Examination, Sept. -2022

Branch/Semester: EC, ME, CE, III	Subject: A.E.M.-I	Subject Code: 3EC201, 3ME2-01, 3CE2-01
Duration: 1.5 hours	Date: 29.9.22 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Jyoti Arora		

Part-A

[2]

1. If  $f(x)$  is a polynomial of  $n^{\text{th}}$  degree in  $x$ , then the  $n^{\text{th}}$  difference of  $f(x)$  is constant

$$\text{i.e. } \Delta^n f(x) = \text{Constant} = \Delta a_n h$$

$$\text{and } \Delta^{n+1} f(x) = 0$$

2. Simpson  $1/3$  Rule

[2]

$$\int_{x_0}^{x_n} y dx = \frac{h}{3} [(y_0 + y_n) + 4(y_1 + y_3 + y_5 + \dots + y_{n-1}) + 2(y_2 + y_4 + \dots + y_{n-2})]$$

Simpson  $3/8$  Rule

$$\int_{x_0}^{x_n} y dx = \frac{3h}{8} [(y_0 + y_n) + 3(y_1 + y_2 + y_4 + y_5 + \dots + y_{n-1}) + 2(y_3 + y_6 + y_9 + \dots + y_{n-3})]$$

3. Let  $f(x) = x^3 - 3x + 4 = 0$

[2]

$$f(-2) = 2 \text{ and } f(-3) = -14$$

$\therefore$  Root will lie between  $-2$  and  $-3$ .

$$\text{let } x_1 = -2, \quad x_2 = -3$$

$$x_3 = \frac{x_1 f(x_2) - x_2 f(x_1)}{f(x_2) - f(x_1)} = \frac{-34}{16} = -2.125$$



**Solution of Question Paper**

I Mid-Term Examination, Sept. -2022

Branch/Semester: EC, ME, CE, III	Subject: AEM-I	Subject Code: 3CE201, 3ME-01, 3CE-2-01
Duration: 1.5 hours	Date: 29.9.22 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Jyoti Arora		

also  $f(-2.125) = 0.779$  (+ve)

∴ Root lies b/w  $-2.125$  and  $-3$

2. Taking  $x_2 = -2.125$  and  $x_3 = -3$

$$x_4 = \frac{x_2 f(x_3) - x_3 f(x_2)}{f(x_3) - f(x_2)}$$

$$= -2.171$$

which is the required root.

[4]

Part-B

4.

x	y	I	II	III	IV
40	31	42			
50	73	51	9	-25	
60	124	35	-16	12	37
70	159	31	-4		
80	190				

$$x = x_0 + uh$$

$$45 = 40 + u \times 10 = 0.5$$

NG Forward Interpolation formula

$$y = y_0 + u \Delta y_0 + \frac{u(u-1)}{2} \Delta^2 y_0 + \frac{u(u-1)(u-2)}{6} \Delta^3 y_0 + \frac{u(u-1)(u-2)(u-3)}{24} \Delta^4 y_0$$



**Solution of Question Paper**

I Mid-Term Examination, Sept. -2022

Branch/Semester: EC, ME, CE	Subject: AEM-I	Subject Code: 3EC2-01/3ME2-01
Duration: 1.5 hours	Date: 29.9.22 Session (I/II/III): II	Max Marks: 20/30/20
Submitted By: Dr. Jyoti Arora		

$$y = 31 + 0.5 \times 42 + \frac{(0.5)(0.5-1)}{2} \times 9 + \frac{0.5(0.5-1)(0.5-2)}{3} \times 37 + \frac{(0.5)(0.5-1)(0.5-2)(0.5-3)}{4} \times 37$$

$$y = 47.8672 \cong 48$$

~~No.~~ No. of students who obtained less than 45 marks = 48

No. of students who obtained More than 45 marks = 190 - 48 = 142 Ans.

5.	x: 4	4.2	4.4	4.6	4.8	5	5.2	$\left[ \begin{aligned} h &= \frac{b-a}{n} \\ h &= \frac{5.2-4}{6} \\ h &= 0.2 \end{aligned} \right.$
	y: 1.3863	1.4351	1.4816	1.5260	1.5686	1.6094	1.6486	

By Trapezoidal Rule

$$I = \int_4^{5.2} \log_e x \, dx$$

$$= \frac{h}{2} [(y_0 + y_6) + 2(y_1 + y_2 + y_3 + y_4 + y_5)]$$

$$= 1.8276$$



Solution of Question Paper

I Mid-Term Examination, Sept. -2022

Branch/Semester: E.C.M.E, CE, III	Subject: AEM I	Subject Code: 3EC(2-0)
Duration: 1.5 hours	Date: 29.9.22 Session (I/II/III): ...II..	Max Marks: 20
Submitted By: Dr. Jyoti Arora		

By actual Integration

$$I = \int_4^{5.2} (\log_e x) dx = [x \log_e x - x]_4^{5.2}$$

$$= 1.8280 \text{ Ans.}$$

6.  $\frac{dy}{dx} = 1 + xy$ ,  $y(0) = 1 \Rightarrow x_0 = 0, y_0 = 1$  [4]

$$y' = 1 + 0 \times 1 = 1$$

$$y'' = y + x \frac{dy}{dx} = 1 + 0 \times 1 = 1$$

$$y''' = \frac{dy}{dx} + \frac{dy}{dx} + x \frac{d^2y}{dx^2}$$

$$= 2 \frac{dy}{dx} + x \frac{d^2y}{dx^2} = 2 \times 1 + 0 \times 1 = 2$$

$$y^{(4)} = 2 \frac{d^2y}{dx^2} + \frac{d^2y}{dx^2} + x \frac{d^3y}{dx^3}$$

$$= 3 \frac{d^2y}{dx^2} + x \frac{d^3y}{dx^3} = 3 \times 1 + 0 \times 2 = 3$$

$$y_1 = 1 + h y_0' + \frac{h^2}{2} y_0'' + \frac{h^3}{6} y_0''' + \frac{h^4}{24} y_0^{(4)} + \dots$$

$$= 1 + 0.1 \times 1 + \frac{(0.1)^2}{2} \times 1 + \frac{(0.1)^3}{6} \times 2 + \frac{(0.1)^4}{24} \times 3$$

$$y_1 = 1.1053 \text{ Ans.}$$



Solution of Question Paper

I Mid-Term Examination, Sept. -2022

Branch/Semester: EC, ME, CE, III	Subject: AEM-I	Subject Codes: 3CE2-01, 3ME2-01
Duration: 1.5 hours	Date: 29.9.22 Session (I/II/III): II...	Max Marks: 20 3CE2-01
Submitted By: Dr. Jyoti Arora		

Part C

[6]

x	y	$\Delta y$	$\Delta^2 y$	$\Delta^3 y$	$\Delta^4 y$	$\Delta^5 y$	$\Delta^6 y$
0	30.28	1.15	0.40				
0.1	31.43	1.55	-0.99	-1.39	2.25		
0.2	32.98	0.56	-0.13	0.86	-1.65	-3.90	6.4
0.3	33.54	0.43	-0.92	-0.79	0.85	2.5	
0.4	33.97	-0.49	-0.86	0.06			
0.5	33.48	-1.35					
0.6	32.13						

for  $x = 0.1$

let  $x_0 = 0.1$

$$x = x_0 + uh$$

$$0.1 = 0.1 + u \times 0.1$$

$$\Rightarrow u = 0$$

$$\begin{aligned} (y')_{u=0} &= \frac{1}{h} \left[ \Delta y_0 - \frac{1}{2} \Delta^2 y_0 + \frac{1}{3} \Delta^3 y_0 - \frac{1}{4} \Delta^4 y_0 + \frac{1}{5} \Delta^5 y_0 \right] \\ &= \frac{1}{0.1} \left[ 1.55 - \frac{1}{2} \times -0.99 + \frac{1}{3} \times 0.86 - \frac{1}{4} \times -1.65 + \frac{1}{5} \times 2.5 \right] \\ &= 32.441667 \text{ Ans.} \end{aligned}$$





Solution of Question Paper

I Mid-Term Examination, Sept. -2022

Branch/Semester: E.E., M.E., C.E., III	Subject: A.E.M.: I	Subject Code: 3CE2-01, 3ME2-01, 3CE2-01
Duration: 1.5 hours	Date: 29.9.22 Session (I/II/III): II....	Max Marks: 20
Submitted By: Dr. Jyoti Arora		

for  $x = 0.5$

let  $x_n = 0.5$

$$x = x_n + uh$$

$$0.5 = 0.5 + u \times 0.1$$

$$\Rightarrow u = 0$$

$$(y')_{u=0} = \frac{1}{h} \left[ \nabla y_n + \frac{1}{2} \nabla^2 y_n + \frac{1}{3} \nabla^3 y_n + \frac{1}{4} \nabla^4 y_n + \frac{1}{5} \nabla^5 y_n \right]$$

$$= \frac{1}{0.1} \left[ -0.49 + \frac{1}{2} x - 0.92 + \frac{1}{3} x - 0.79 + \frac{1}{4} x + 0.65 + \frac{1}{5} x - 3.9 \right]$$

$$= -24.0583 \text{ Ans.}$$

[6]

8.  $f(x, y) = x + y$ ,  $x_0 = 1$ ,  $y_0 = 0$

Runge Kutta formula is

$$y_{n+1} = y_n + k$$

$$k = \frac{1}{6} (k_1 + 2k_2 + 2k_3 + k_4)$$

where  $k_1 = hf(x_n, y_n)$

$$k_2 = hf\left(x_n + \frac{h}{2}, y_n + \frac{k_1}{2}\right)$$

$$k_3 = hf\left(x_n + \frac{h}{2}, y_n + \frac{k_2}{2}\right)$$

$$k_4 = hf(x_n + h, y_n + k_3)$$



Solution of Question Paper

I Mid-Term Examination, Sept. -2022

Branch/Semester: EC, CE, ME	Subject: A.E.M.I	Subject Code: 2EC2-01, 3CE2-01
Duration: 1.5 hours	Date: 29.9.22 Session (I/II/III): II...	Max Marks: 20. 3ME2-01
Submitted By: Dr. Jyoti Anora		

$$k_1 = hf(x_0, y_0)$$

$$= 0.1 f(1, 0)$$

$$= 0.1 (1 + 0)$$

$$k_1 = 0.1$$

$$k_2 = hf(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2})$$

$$k_2 = 0.11$$

$$k_3 = hf(x_0 + \frac{h}{2}, y_0 + \frac{k_2}{2})$$

$$k_3 = 0.1105$$

$$k_4 = hf(x_0 + h, y_0 + k_3)$$

$$k_4 = 0.12105$$

$$k = \frac{1}{6} (k_1 + 2k_2 + 2k_3 + k_4)$$

$$k = \frac{1}{6} (0.1 + 2 \times 0.11 + 2 \times 0.1105 + 0.12105)$$

$$k = 0.1103$$

$$y_1 = y_0 + k$$

$$= 0 + 0.1103$$

$$y_1 = 0.1103 \text{ Ans. (at } x=1.1)$$



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**Analysis of Question Paper**  
**I Mid-Term Examination, Sept.- 2022**

Branch/Semester: EC,ME,CE/III	Subject: AEM-I	Subject Code:3EC2-01,3ME2-01,3CE2-01
Duration: 1.5 hours	Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Jyoti Arora		

**A. Distribution of Course Outcome and Bloom's Taxonomy in Question Paper**

Q. No	Questions	Marks	CO	BL																
1	State Fundamental Theorem of Finite Difference Calculus	2	1	1																
2	Write the formulae of Simpson 1/3 rule and Simpson 3/8 Rule.	2	1	1																
3	Find the approximate value of the real root of the equation $x^3 - 3x + 4 = 0$ , using the method of false position	2	2	3																
4	From the following table find the number of students who obtained (a) Less than 45 marks (b) More than 45 marks <table border="1" style="margin-left: 20px;"> <tr> <td>Marks obtained</td> <td>30-40</td> <td>40-50</td> <td>50-60</td> <td>60-70</td> <td>70-80</td> </tr> <tr> <td>No. of students</td> <td>31</td> <td>42</td> <td>51</td> <td>35</td> <td>31</td> </tr> </table>	Marks obtained	30-40	40-50	50-60	60-70	70-80	No. of students	31	42	51	35	31	4	1	5				
Marks obtained	30-40	40-50	50-60	60-70	70-80															
No. of students	31	42	51	35	31															
5	Evaluate $\int_4^{5.2} \log_e x dx$ , by Trapezoidal rule.	4	1	5																
6	Given $\frac{dy}{dx} = 1 + xy$ with initial condition that $y = 1$ at $x = 0$ , Compute $y(0.1)$ Correct to four places of decimal by using Taylor Series Method.	4	2	5																
7	Evaluate $\frac{dy}{dx}$ at $x = 0.1$ and $x = 0.5$ from the following data- <table border="1" style="margin-left: 20px;"> <tr> <td>x</td> <td>0</td> <td>0.1</td> <td>0.2</td> <td>0.3</td> <td>0.4</td> <td>0.5</td> <td>0.6</td> </tr> <tr> <td>f(x)</td> <td>30.28</td> <td>31.43</td> <td>32.98</td> <td>33.54</td> <td>33.97</td> <td>33.48</td> <td>32.13</td> </tr> </table>	x	0	0.1	0.2	0.3	0.4	0.5	0.6	f(x)	30.28	31.43	32.98	33.54	33.97	33.48	32.13	6	1	5
x	0	0.1	0.2	0.3	0.4	0.5	0.6													
f(x)	30.28	31.43	32.98	33.54	33.97	33.48	32.13													
8	Use Runge Kutta method to solve $\frac{dy}{dx} = x + y$ , $x_0 = 1, y_0 = 0$ for $x=1.1$ with $h = 0.1$	6	2	3																

**BL – Bloom's Taxonomy Level**

(1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 - Creating)

**CO – Course Outcome**



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Analysis of Question Paper  
I Mid-Term Examination, Sept.- 2022

Branch/Semester: EC,ME,CE/III	Subject: AEM-I	Subject Code:3EC2-01,3ME2-01,3CE2-01
Duration: 1.5 hours	Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Jyoti Arora		

B. Questions and Course Outcomes (COs) Mapping in terms of correlation

COs	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
CO1	3	3		3	3		3	
CO2			3			3		3
CO3								
CO4								
CO5								

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

C. Mapping of Bloom's Level and Course Outcomes with Question Paper

Bloom's Level Mapping		CO Mapping	
Bloom's Level	Percentage	CO	Percentage
BL1	13.33	CO1	60
BL2		CO2	40
BL3	26.66	CO3	
BL4		CO4	
BL5	60	CO5	
BL6		CO6	

CO's Attainment (Theory Mid Term : I)

Department: Mathematics

Faculty Name: Dr. Jyoti Arora

Course Name with CODE: AEM-1,JCE2-01

Upon successful completion of this course, students will be able to:

CO1: Explain the concept of operators, finite differences and interpolation

CO2: Apply Numerical methods to solve first order Ordinary Differential Equations and Algebraic and Transcendental equations

CO3: Use Laplace Transforms in Engineering Applications.

CO4: Demonstrate the ability of solving ordinary differential equations and partial differential equations by Fourier transform

CO5: Determine the solution of difference equations by use of z transform.

MID TERM EVALUATION										Section-A				
S.NO.	ROLL NO	PART →	A			B			C		Total (20)	Assignment (10)	Total (30)	
		Note →	Attempt All											
		QUESTION NO. →	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8				
		COURSE OUTCOME(S) SATISFIED →	CO1	CO1	CO2	CO1	CO1	CO2	CO1	CO2				
		MAXIMUM MARKS →	2	2	2	4	4	4	6	6				
		MINIMUM QUALIFYING MARKS (50%) →	1	1	1	2	2	2	3	3				
NAME OF STUDENT ↓														
1	21ESKCE001	Aarti Rajpurohit	2	2	2	2	1	NA	NA	6	15	10	25	
2	21ESKCE002	Abhishek Meena	2	2	2	4	4	NA	NA	6	20	10	30	
3	21ESKCE003	Aditya Poonia	2	2	2	2	4	NA	NA	6	18	10	28	
4	21ESKCE004	Aditya Soni	1.5	2	0	2	1	NA	2	NA	8.5	10	19	
5	21ESKCE005	Akshansh Saini	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	DB+8	
6	21ESKCE006	Akshat Saini	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10	
7	21ESKCE007	Akshat Sharma	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	DB+8	
8	21ESKCE008	Almazim Akhtar	2	2	2	4	4	NA	NA	6	20	10	30	
9	21ESKCE009	Arjun Sharma	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10	
10	21ESKCE010	Arvind Kumar Meena	2	2	0	2	1	NA	NA	6	13	8	21	
11	21ESKCE011	Bhavish Kanwat	2	2	2	4	1	NA	NA	0	11	10	21	
12	21ESKCE012	Chandraprakash Meena	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	DB+8	
13	21ESKCE013	Daksh Meena	1	1	NA	2	0	NA	NA	2	6	10	16	
14	21ESKCE014	Darshit Mathur	2	2	2	4	4	NA	NA	6	20	10	30	
15	21ESKCE015	Deepak Mina	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10	
16	21ESKCE016	Deepanshu	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB+NS	
17	21ESKCE017	Deepjyoti Mech	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10	
18	21ESKCE019	Dinesh Sharma	2	2	2	2	1	NA	4	NA	13	10	23	
19	21ESKCE022	Faiguni Pareta	2	2	2	4	4	NA	NA	6	20	10	30	
20	21ESKCE023	Fariyad Khan	0	0	NA	0	NA	NA	NA	4	4	8	12	
21	21ESKCE025	Gaurav Jorwal	DB	DB	DB	DB	DB	DB	DB	DB	DB	7	DB+7	
22	21ESKCE026	Ghanshyam Singh Gurjar	0	0	NA	0	NA	NA	NA	1	1	10	11	
23	21ESKCE027	Gurudeep Singh Choudhary	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	DB+8	
24	21ESKCE028	Hanuman Saini	2	2	0	0	NA	0	NA	1	5	10	15	
25	21ESKCE029	Harsh Meena	2	2	0	NA	1	0	0	NA	5	10	15	
26	21ESKCE030	Himanshu Tunwal	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10	
27	21ESKCE031	Himesh Kumawat	2	2	0	2	4	NA	NA	6	16	10	26	
28	21ESKCE032	Hitanshu Chhandwal	2	2	NA	2	4	NA	NA	6	16	10	26	
29	21ESKCE033	Jalvardhan Singh Khangarot	NA	2	0	2	3	NA	NA	6	13	10	23	
30	21ESKCE034	Jaspreet Singh	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB+NS	
31	21ESKCE035	Jaswant Jangid	2	2	2	4	4	NA	NA	6	20	10	30	
32	21ESKCE036	Jitendra Saini	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10	

33	21ESKCE037	Jugal Kishor Choudhary	NA	2	0	NA	1	1	NA	2	6	10	16
34	21ESKCE038	Kamlesh Gurjar	NA	NA	2	2	NA	NA	NA	NA	4	10	14
35	21ESKCE039	Kanishk Bhardwaj	0	2	0	2	NA	NA	NA	NA	4	8	12
36	21ESKCE040	Kanishk Patidar	NA	1	NA	4	NA	NA	NA	6	11	10	21
37	21ESKCE041	Kanishka Khorwal	1.5	2	1	4	4	NA	NA	3	15.5	10	26
38	21ESKCE042	Karan Moond	1.5	2	2	0	1	NA	2	NA	8.5	10	19
39	21ESKCE043	Khan Mosim Wahid	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10
40	21ESKCE044	Kiran Choudhary	2	2		4	1.5	NA	NA	3	12.5	10	23
41	21ESKCE045	Kunal Singh Rathore	0	2	1	4	4	NA	NA	6	17	10	27
42	21ESKCE046	Lavish Ahuja	2	2	2	4	2	NA	NA	6	18	10	28
43	21ESKCE047	Mahendra Chhaba	2	2	1	4	1	NA	NA	5	15	10	25
44	21ESKCE048	Manas Sharma	1.5	2	2	4	1	NA	NA	6	16.5	10	27
45	21ESKCE049	Manik Mehra	2	2	0	NA	3	NA	2	NA	9	10	19
46	21ESKCE050	Mansi Aasari	1.5	2	2	4	4	NA	NA	6	19.5	10	30
47	21ESKCE051	Meet Khandelwal	2	2	2	4	4	NA	NA	6	20	10	30
48	21ESKCE053	Mohit Meena	2	2	2	2	3	NA	NA	0	11	10	21
49	21ESKCE054	Mriduraj Singh Rathore	1	2	2	1	1	NA	NA	4.5	11.5	10	22
50	21ESKCE055	Namesya Choudhary	0	2	0	2	1	NA	NA	6	11	10	21
51	21ESKCE056	Nandini Singhal	1	2	2	2	1	NA	2	NA	10	10	20
52	21ESKCE057	Neeraj Singh Meena	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10
Total No. of DEBARRED (DB)			8	8	8	8	8	8	8	8			
Total No. of ABSENT (AB)			1	1	1	1	1	1	1	1			
Total Students Appeared for Exam (A)			37	37	37	37	37	37	37	37			
Total Students Attempted the Question (A)			33	36	31	34	31	3	6	29			
No. of Students scored >=50% marks (B)			28	34	21	29	16	0	1	23			
Percentage Attainment of Criterion (B/A)			84.85	94.44	67.74	85.29	51.61	0.00	16.67	79.31			
CO Attainment Level			3	3	2	3	1	0	2	2			
Attainment of CO-1			81%	3									
Attainment of CO-2			50%	1									
Attainment of CO-3			NIL	NIL									
Attainment of CO-4			NIL	NIL									
Attainment of CO-5			NIL	NIL									
Criterion of Percentage for CO Attainment Level			Attainment Level										
Percentage attainment Below 60%			1										
Percentage attainment 60%-69.99%			2										
Percentage attainment Above and equal to 70%			3										

Jyoti Arora

## Swami Keshvanand Institute of Technology, Management &amp; Gramothan, Jaipur

B.Tech II Year III Semester (Session 2022-2023)

CO's Attainment (Theory Mid Term : I)

Department: Mathematics

Faculty Name: Dr. Jyoti Arora

Course Name with CODE: AEM-I,3CE2-01

Upon successful completion of this course, students will be able to:

CO1: Explain the concept of operators, finite differences and interpolation

CO2: Apply Numerical methods to solve first order Ordinary Differential Equations and Algebraic and Transcendental equations

CO3: Use Laplace Transforms in Engineering Applications.

CO4: Demonstrate the ability of solving ordinary differential equations and partial differential equations by Fourier transform

CO5: Determine the solution of difference equations by use of z transform.

## MID TERM EVALUATION

## Section-B

S.NO.	ROLL NO	PART →	MID TERM EVALUATION								Section-B				
			Note →	A			B			C		Total (20)	Assignme nt (10)	Total (30)	
				Attempt All											
				QUESTION NO. →	Q1	Q2	Q3	Q4	Q5	Q6	Q7				Q8
				COURSE OUTCOME(S) SATISFIED →	CO1	CO1	CO2	CO1	CO1	CO2	CO1				CO2
				MAXIMUM MARKS →	2	2	2	4	4	4	6				6
MINIMUM QUALIFYING MARKS (50%) →	1	1	1	2	2	2	3	3							
NAME OF STUDENT ↓															
1	21ESKCE058	Nehansh Barjatya	2	2	2	4	4	NA	NA	6	20	10	30		
2	21ESKCE059	Nikhil Garg	2	2	2	4	4	NA	3	NA	17	10	27		
3	21ESKCE060	Nikhil Suwalka	2	2	1	NA	NA	NA	1	NA	6	10	16		
4	21ESKCE061	Nupur Singh Choudhary	1	2	0	2	1	NA	NA	4	10	10	20		
5	21ESKCE062	Palkendra Mandawat	2	1	NA	NA	NA	NA	NA	6	9	10	19		
6	21ESKCE063	Pawan Kumar Dhakar	2	2	2	2	1	NA	NA	6	15	10	25		
7	21ESKCE064	Prakash Meena	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	DB+8		
8	21ESKCE065	Prakash Sharma	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10		
9	21ESKCE066	Pranav Pratap Singh Naruka	NA	2	NA	2	NA	NA	NA	6	10	10	20		
10	21ESKCE067	Prince Kumar Sharma	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10		
11	21ESKCE068	Priya Meena	NA	NA	NA	NA	NA	NA	NA	6	6	10	16		
12	21ESKCE069	Priyanshu Prajapat	2	2	0	4	0	NA	NA	6	14	10	24		
13	21ESKCE070	Puneet Dadhich	2	2	2	4	4	NA	6	NA	20	10	30		
14	21ESKCE071	Purva Kumawat	2	2	1	4	1	NA	NA	6	16	10	26		
15	21ESKCE072	Pushpit Parashar	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10		
16	21ESKCE073	Rahul Kumar Meena	DB	DB	DB	DB	DB	DB	DB	DB	DB	7	DB+7		
17	21ESKCE074	Rajat Bhaskar	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10		
18	21ESKCE075	Rakesh Pooniya	0	2	0	2	0.5	NA	NA	1	5.5	10	16		
19	21ESKCE076	Ravi Meena	NA	2	NA	0	NA	NA	NA	NA	2	10	12		
20	21ESKCE077	Renu Kumari	2	2	NA	1	1	NA	2	NA	8	10	18		
21	21ESKCE078	Reva Verma	2	2	2	0	1	NA	NA	0	7	10	17		
22	21ESKCE079	Rinku	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+7		
23	21ESKCE080	Ritika Meena	2	2	NA	4	4	NA	NA	6	18	10	28		
24	21ESKCE081	Ritish Thakur	NA	0	NA	2	NA	NA	0	NA	2	10	12		
25	21ESKCE082	Rochit Ujjainwal	2	1	0	2	1	NA	NA	2	8	10	18		
26	21ESKCE083	Rohit Kajla	2	2	NA	2	NA	1.5	NA	6	13.5	10	24		

27	21ESKCE084	Saarthak Chopra	2	2	0	2	1	NA	NA	6	13	10	23
28	21ESKCE085	Sachin Meena	1	0	0	0	NA	NA	0	NA	1	10	11
29	21ESKCE086	Sajid Khan	1	0	0	0	0	NA	2	0	3	10	13
30	21ESKCE087	Saloni Meena	2	2	2	2	2	NA	NA	6	16	10	26
31	21ESKCE088	Sandeep Kumar Meena	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10
32	21ESKCE089	Sapna Meena	0	0	2	0	0	NA	NA	6	8	10	18
33	21ESKCE090	Seema Lega	2	2	2	2	1	NA	NA	6	15	10	25
34	21ESKCE091	Sheikh Animul Rehman	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10
35	21ESKCE092	Shreyansh Nagarwal	2	NA	NA	NA	1	NA	NA	6	9	10	19
36	21ESKCE093	Simran Choudhary	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10
37	21ESKCE095	Sukhdev Saraswat	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	DB+10
38	21ESKCE096	Sumit Meena	2	2	NA	2	1	NA	NA	6	13	10	23
39	21ESKCE097	Uday Singh Sisodia	2	2	NA	2	NA	NA	NA	0	6	10	16
40	21ESKCE098	Urvashi Gautam	2	2	2	NA	4	2	NA	6	18	10	28
41	21ESKCE100	Vijay Kumar	0	2	0	2	NA	1	NA	6	11	10	21
42	21ESKCE102	Vipul Raman	2	2	0	2	NA	NA	NA	NA	6	10	16
43	21ESKCE103	Virender Singh	2	2	2	2	0	NA	NA	6	14	10	24
44	21ESKCE104	Vishnu Saini	2	2	0	0	1	NA	NA	6	11	10	21
45	21ESKCE105	Yash Mathur	2	2	2	2	NA	0	NA	2	10	10	20
46	21ESKCE106	Yogendra Bhambhu	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10
47	21ESKCE107	Yuvraj Sharma	2	1	1.5	2	1	NA	NA	6	13.5	10	24
Total No. of DEBARRED (DB)			9	9	9	9	9	9	9	9			
Total No. of ABSENT (AB)			3	3	3	3	3	3	3	3			
Total Students Appeared for Exam (A)			35	35	35	35	35	35	35	35			
Total Students Attempted the Question (A)			31	33	24	30	23	4	7	27			
No. of Students scored >=50% marks (B)			28	29	14	23	6	1	2	21			
Percentage Attainment of Criterion (B/A)			90.32	87.88	58.33	76.67	26.09	25.00	28.57	77.78			
CO Attainment Level			3	3	2	3	1	0	2	2			
Attainment of CO-1			62%	2									
Attainment of CO-2			54%	3									
Attainment of CO-3			NIL	NIL									
Attainment of CO-4			NIL	NIL									
Attainment of CO-5			NIL	NIL									
Criterion of Percentage for CO Attainment Level			Attainment Level										
Percentage attainment Below 60%			1										
Percentage attainment 60%-69.99%			2										
Percentage attainment Above and equal to 70%			3										

*Jyoti Arora*





Swami Keshvanand Institute of Technology, Management  
& Gramothan, Jaipur

I Mid Term Examination, Sept.-2022

Semester:	VII	Branch:	ECE
Subject:	Cyber Security	Subject Code:	7CS6-60.2
Time:	1.5 Hours	Maximum Marks:	24
Session (I/II/III): I			

**PART A (short-answer type questions)**

(All questions are compulsory)

Attempt all questions. (4 x 2=8)

1. Define cyber stalking?
2. Define Phishing and spamming.
3. State 5 cybercrimes which can happen against organization.
4. Write down the traditional and modern technique of credit card fraud.

**PART B (Analytical/Problem solving questions)**

(Attempt any 2 Questions) (2\*4=8)

5. Explain the cloud computing and services provided by Cloud Computing?
6. Botnets are known as fuel for cybercrimes. Explain Botnet architecture.
7. Define Cyber criminals. Write down the cybercriminal attack technique.

**PART C (Descriptive/Analytical/Problem solving/Design questions)**

(Attempt any 1 Question) (1\*8=8)

8. Explain the structure and offenses under Information Technology Act 2000.
9. Explain organizational security policies as measures in mobile computing era.



**Solution of Question Paper**  
**I Mid-Term Examination, Sept. -2022**

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: 7CS6-60.2
Duration: 1.5 hours	Date:1/10/2022 Session (I/II/III): I	Max Marks:24
Submitted By: Dr. P.K.Jain Manju Choudhary		

**Ans:1 Cyber Stalking:**

- Stalking is the act of following a particular person for a long time. Usually, a stalker follows the following person everywhere and also threatened by repeatedly calling or sending messages.
- In cyberstalking, the stalking is done by using the internet or electronic media which involves sending emails and SMSs to that person or victim.
- Cyber stalkers take unfair advantage of the internet to keep them unidentified. The cyberstalking cases are going on increasing with the widespread internet boom.
- Cyberstalking is a serious crime and there are few provisions in India to deal with it.

**Types of Cyber Stalking-**

- Catfishing
- Monitoring location check-ins on social media
- Visiting virtually via Google Maps Street View
- Hijacking webcam
- Installing Stalker ware
- Looking at geotags to track location

**Ans:2 Phishing and Spamming:**

**Phishing:** It is believed that Phishing is an alternative spelling of “fishing,” as in “to fish for information.” Phishing (pronounced: fishing) is an attack that attempts to steal your money, or your identity, by getting you to reveal personal information -- such as credit card numbers, bank information, or passwords -- on websites that pretend to be legitimate.

Phishing attacks are the practice of sending fraudulent communications that appear to come from a reputable source. It is usually done through email. The goal is to steal sensitive data like credit card and login information, or to install malware on the victim’s machine. Phishing is a common type of cyber attack that everyone should learn about in order to protect themselves.

**Spamming:**

- Spam is the abuse of electronic messages systems (including most broadcast media, digital delivery



**Solution of Question Paper**  
**I Mid-Term Examination, Sept. -2022**

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: 7CS6-60.2
Duration: 1.5 hours	Date:1/10/2022 Session (I/II/III): I	Max Marks:24
Submitted By: Dr. P.K.Jain Manju Choudhary		

systems) to send **unsolicited bulk messages indiscriminately.**

- Spam is digital junk mail and unsolicited communications sent in bulk through an electronic messaging system.
- Unrequested, disruptive, and usually promotional, spam messages are designed to flood as many inboxes as possible. Traditionally, spam has been sent via email, but also includes SMS and social media messaging.
- People who create **electronic Spam** are called **spammers.**
- Similar abuses in other media: instant messaging Spam, Usenet newsgroup Spam, web search engine Spam, Spam in blogs, online classified ads Spam, mobile phone messaging Spam, social networking Spam, file sharing network Spam, video sharing sites, etc

**Ans:3 State 5 cybercrimes which can happen against organization:**

- Unauthorized accessing of computer
- Password sniffing
- Denial-of-service attacks
- Virus
- E-Mail bombing
- Salami attack
- Logic bomb
- Trojan horse
- Data diddling
- Industrial spying
- Crimes emanating from Usenet newsgroup
- Computer network intrusions



**Solution of Question Paper**  
**I Mid-Term Examination, Sept. -2022**

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code 7CS6-60.2
Duration: 1.5 hours	Date:1/10/2022 Session (I/II/III): I	Max Marks:24
Submitted By: Dr. P.K.Jain Manju Choudhary		

**Ans:4 Traditional and Modern Technique of credit card fraud:**

**TRADITIONAL TECHNIQUES**

A. APPLICATION FRAUD-It is paper-based fraud.

- ID THEFT- Where an individual pretends to be someone else
- FINANCIAL FRAUD- Stealing a credit card is either by pickpocket or from postal service

**2. MODERN TECHNIQUES**

A. Triangulation- Using third party

B. Credit card generators-It facilitates generation of valid credit card numbers with expiry date

C. Skimming- Crooks use a small device to steal credit card information.

D. Site Cloning- Site cloning is creating a web page or the full website which is an exact replica of a reputed website.

**Ans:5 Cloud Computing and Services provided by Cloud Computing are as follows:**

- **Cloud computing:** Cloud computing is the delivery of different services through the Internet. These resources include tools and applications like data storage, servers, databases, networking, and software. Rather than keeping files on a proprietary hard drive or local storage device, cloud-based storage makes it possible to save them to a remote database. As long as an electronic device has access to the web, it has access to the data and the software programs to run it. Services can be both public and private—public services are provided online for a fee while private services are hosted on a network to specific clients. Cloud security has become an increasingly important field in IT.

**Cloud Computing Services:**

- **Infrastructure-as-a-service:** It is like Amazon Web services that provide virtual servers with unique IP address and blocks of storage on demand. Customers benefit from an Application Programmable Interface from which they can control their servers. As customers can pay for exactly the amount of service they use, like for electricity or water.
- **Platform-as-a-service:** It is a set of software and development tools hosted on the provider's



**Solution of Question Paper**  
I Mid-Term Examination, Sept. -2022

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: /CS6-60.2
Duration: 1.5 hours	Date:1/10/2022	Session (I/II/III): I
Submitted By: Dr. P.K.Jain Manju Choudhary		Max Marks:24

servers. Developers can create applications using the provider's API. Google Apps is one of the most famous PaaS providers. Developers should take notice that they are not any interoperability standards.

- **Software-as-a-service:** It is the broadcast market. In this the provider allows the customer only to use its applications. The software interacts with the user through a user interface. These application can be anything from Web-based E-Mail to applications such as Twitter or Last.fm.

**Ans:6 Botnets are known as fuel for cybercrimes:**

- A botnet (also known as a zombie army) is a number of Internet computers that, although their owners are unaware of it, have been set up to forward transmissions (including spam or viruses) to other computers on the Internet.
- The term botnet is derived from the words robot and network. A bot in this case is a device infected by malicious code, which then becomes part of a network, or net, of infected devices controlled by a single attacker or attack group.
- A bot is sometimes called a zombie, and a botnet is sometimes referred to as a zombie army. Both names (bot and zombie) imply the mindless automatic propagation of something malicious (malware) by agents that are possessed in some way (by the threat actor).
- The botnet malware typically looks for vulnerable devices across the internet, rather than targeting specific individuals, companies or industries.
- Objective for creating a botnet is to infect as many connected devices as possible and to use the computing power and resources of those devices for automated tasks that generally remain hidden to the users of the devices.
- For example, an ad fraud botnet that infects a user's PC will take over the system's web browsers to divert fraudulent traffic to certain online advertisements. However, to stay concealed, the botnet won't take complete control of the web browsers, which would alert the user.

**Botnet Architecture-**

- Once the desired number of devices is infected, attackers can control the bots using two different approaches.
- The traditional client-server approach involves setting up a command and control (C&C) server and sending automated commands to infected botnet clients through a communications protocol, such as Internet Relay Chat (IRC).



**Solution of Question Paper**  
**I Mid-Term Examination, Sept. -2022**

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: 7CS6-60.2
Duration: 1.5 hours	Date:1/10/2022 Session (I/II/III): I	Max Marks:24
Submitted By: Dr. P.K.Jain Manju Choudhary		

- The bots are often programmed to remain dormant and await commands from the C&C server before initiating any malicious activities.
- The other approach to controlling infected bots involves a peer-to-peer network. Instead of using C&C servers, a peer-to-peer (P2P) botnet relies on a decentralized approach. Infected devices may be programmed to scan for malicious websites or even for other devices in the same botnet. The bots can then share updated commands or the latest versions of the botnet malware.
- The P2P approach is more common today, as cybercriminals and hacker groups try to avoid detection by cybersecurity vendors and law enforcement agencies, which have often used C&C communications to monitor for, locate and disrupt botnet operations.

**Ans:7 Cyber criminals, categories and Cybercriminal attack technique:**

- Cybercriminals are individuals or teams of people who use technology to commit malicious activities on digital systems or networks with the intention of stealing sensitive company information or personal data, and generating profit.
- Cybercriminals are known to access the cybercriminal underground markets found in the deep web to trade malicious goods and services, such as hacking tools and stolen data.
- Laws related to cybercrime continue to evolve across various countries worldwide. Law enforcement agencies are also continually challenged when it comes to finding, arresting, charging, and proving cybercrimes.

**Cyber Criminals' categorization-**

**Type I: Cybercriminals- hungry for recognition**

- Hobby hackers
- IT professionals
- Politically motivated hackers
- Terrorist organizations

**Type II: Cybercriminals- not interested in recognition**

- Psychological perverts
- Financially motivated hackers
- State-sponsored hacking
- Organized criminals

**Type III: cybercriminals- the insiders**



**Solution of Question Paper**  
I Mid-Term Examination, Sept. -2022

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: 7CS6-60.2
Duration: 1.5 hours	Date: 1/10/2022	Session (I/II/III): I
Submitted By: Dr. P.K.Jain Manju Choudhary		Max Marks: 24

- Former employees seeking revenge
- Competing companies using employees to gain economic advantage through damage and/or theft

**Cybercriminal attack technique:**

- Botnet - a network of software robots, or bots, that automatically spread malware.
- Fast Flux - moving data quickly among the computers in a botnet to make it difficult to trace the source of malware or phishing websites.
- Zombie Computer - a computer that has been hacked into and is used to launch malicious attacks or to become part of a botnet.
- Social Engineering - using lies and manipulation to trick people into revealing their personal information. Phishing is a form of social engineering.
- Denial-of-Service attacks - flooding a network or server with traffic in order to make it unavailable to its users.
- Skimmers - Devices that steal credit card information when the card is swiped through them. This can happen in stores or restaurants when the card is out of the owner's view, and frequently the credit card information is then sold online through a criminal community.

**Answer 8:**

Indian parliament passed the law-Information Technology Act, 2000. The IT Act 2000 has been conceptualized on the **United Nations Commissions on International Trade Law (UNCITRAL)** model.

The Information Technology (IT) Act 2000 can be defined as: "to provide legal recognition for transactions carried out by means of electronic data interchange and other means of electronic communication, commonly referred to as "electronic commerce", which involve the use of alternatives to paper-based methods of communication and storage of information, to facilitate electronic filing of documents with the Government agencies and further to amend the Indian Penal Code, the Indian Evidence Act, 1872, the Bankers Books Evidence Act, 1891 and the Reserve Bank of India Act, 1934 and for matters connected therewith or incidental thereto.

The Act essentially deals with the following issues:

- Legal Recognition of Electronic Documents



**Solution of Question Paper**  
**I Mid-Term Examination, Sept. -2022**

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: 7CS6-60.2
Duration: 1.5 hours	Date:1/10/2022 Session (I/II/III): I	Max Marks:24
Submitted By: Dr. P.K.Jain Manju Choudhary		

- Legal Recognition of Digital Signatures
- Offenses and Contraventions
- Justice Dispensation Systems for cyber crimes

**Structure of IT Act**

**(a) Contents**

- The Information Technology Act, 2000 contains the following :-
- 13 chapters.
- 94 sections.
- 4 schedules.

**(b) Sections**

Some of the important sections of the IT Act 2000 are :-

- Section 1 to 14 Legal aspects for Digital Signature.
- Section 15 to 42 License for Digital Signature Certificate.
- Section 43 to 47 Penalties and compensation.
- Section 48 to 64 Tribunals and appeal to High Court, etc.
- Section 65 to 79 Offences.
- Section 80 to 94 Miscellaneous Provisions.

**Offenses Under the IT Act, 2000**

**1. Tampering with computer source documents:**

**Section 65** of this Act provides that Whoever knowingly or intentionally conceals, destroys or alters or intentionally or knowingly causes another to conceal, destroy or alter any computer source code used for a computer, computer programme, computer system or computer network, when the computer source code is required to be kept or maintained by law for the being time in force, shall be punishable with imprisonment up to three year, or with fine which may extend up to two lakh rupees, or with both.

- **Section 65** is tried by any magistrate. This is cognizable and non- bailable offense. Imprisonment up to 3 years and or Fine up to Two lakh rupees.

**2. Hacking with the computer system:**

**Section 66** provides that-





**Solution of Question Paper**  
**I Mid-Term Examination, Sept. -2022**

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: 7CS6-60.2
Duration: 1.5 hours	Date:1/10/2022 Session (I/II/III): I	Max Marks:24
Submitted By: Dr. P.K.Jain Manju Choudhary		

(1) Whoever with the intent to cause or knowing that he is likely to cause wrongful loss or damage to the public or any person destroys or deletes or alters any information residing in a computer resource or diminishes its value or utility or affects it injuriously by any means, commits hacking.

(2) Whoever commits hacking shall be punished with imprisonment up to three years, or with fine which may extend up to two lakh rupees, or with both.

**Punishment:** Imprisoned up to three years and fine which may extend up to two lakh rupees or with both.

**3. Publishing of Obscene Information In Electronic Form:**

- **Section 67** of this Act provides that Whoever publishes or transmits or causes to be published in the electronic form, any material which is lascivious or appeals to the prurient interest or if its effect is such as to tend to deprave and corrupt persons who are likely, having regard to all relevant circumstance, to read see or hear the matter contained or embodied in it.
- Shall be **punished** on first conviction with imprisonment of either description for a term which may extend to five years and with fine which may extend to one lakh rupees and in the event of a second or subsequent conviction with imprisonment of either description for a term which may extend to ten years and also with fine which may extend to two lakh rupees.

**4. Power of Controller to give directions:**

**Section 68** of this Act provides that

(1) The Controller may, by order, direct a Certifying Authority or any employee of such Authority to take such measures or cease carrying on such activities as specified in the order if those are necessary to ensure compliance with the provisions of this Act, rules or any regulations made the reunder.

(2) Any person who fails to comply with any order under sub-section (1) shall be guilty of an offense and shall be liable on conviction to imprisonment for a term not exceeding three years or to a fine not exceeding two lakh rupees or to both.

- The offense under this section is non-bailable & cognizable.
- **Punishment:** Imprisonment up to a term not exceeding three years or fine not exceeding two lakh rupees.

**5. Directions of Controller to a subscriber to extend facilities to decrypt information:**



**Solution of Question Paper**  
**I Mid-Term Examination, Sept. -2022**

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: 7CS6-60.2
Duration: 1.5 hours	Date:1/10/2022 Session (I/II/III): I	Max Marks:24
Submitted By: Dr. P.K.Jain Manju Choudhary		

**Section 69** provides that-

(1) If the Controller is satisfied that it is necessary or expedient so to do in the interest of the sovereignty or integrity of India, the security of the State, friendly relations with foreign States or public order or for preventing incitement to the commission of any cognizable offense; for reasons to be recorded in writing, by order, direct any agency of the Government to intercept any information transmitted through any computer resource.

(2) The subscriber or any person in charge of the computer resource shall, when called upon by any agency which has been directed under sub-section (1), extend all facilities and technical assistance to decrypt the information.

(3) The subscriber or any person who fails to assist the agency referred to in subsection shall be punished with imprisonment for a term which may extend to seven years.  
Punishment: Imprisonment for a term which may extend to seven years. The offense is cognizable and non-bailable.

**6. Protected System:**

**Section 70** of this Act provides that –

- The appropriate Government may, by notification in the Official Gazette, declare that any computer, computer system or computer network to be a protected system.
- The appropriate Government may, by order in writing, authorize the persons who are authorized to access protected systems notified under sub-section (1).
- Any person who secures access or attempts to secure access to a protected system in contravention of the provision of this section shall be punished with imprisonment of either description for a term which may extend to ten years and shall also be liable to fine.

**Punishment:** The imprisonment which may extend to ten years and fine.

**7. Penalty For Misrepresentation:**

**Section 71** provides that-

Whoever makes any misrepresentation to, or suppresses any material fact from, the Controller or the Certifying Authority for obtaining any license or Digital Signature Certificate, as the case may be, shall be



**Solution of Question Paper**  
**I Mid-Term Examination, Sept. -2022**

Branch/Semester: EC/VII	Subject: Cyber Security	Subject Code: 7CS6-60.2
Duration: 1.5 hours	Date:1/10/2022 Session (I/II/III): I	Max Marks:24
Submitted By: Dr. P.K.Jain Manju Choudhary		

punished with imprisonment for a term which may extend to two years, or which fine which may extend to one lakh rupees, or with both.

**Punishment:** Imprisonment which may extend to two years or fine may extend to one lakh rupees or with both.

**8. Penalty for breach of confidentiality and privacy:**

**Section 72** provides that-

Save as otherwise provide in this Act or any other law for the time being in force, any person who, in pursuance of any of the powers conferred under this Act, rules or regulation made thereunder, has secured access to any electronic record, book, register, correspondence, information, document or other material without the consent of the person concerned discloses such material to any other person shall be punished with imprisonment for a term which may extend to two years, or with fine which may extend to one lakh rupees, or with both.

**9. Penalty for publishing Digital Signature Certificate false in certain particulars:**

**Section 73** provides that – (1) No person shall publish a Digital Signature Certificate or otherwise make it available to any other person with the knowledge that-

- The Certifying Authority listed in the certificate has not issued it; or
  - (b) The subscriber listed in the certificate has not accepted it; or
  - (c) The certificate has been revoked or suspended unless such publication is for the purpose of verifying a digital signature created prior to such suspension or revocation.
- (2) Any person who contravenes the provisions of sub-section (1) shall be punished with imprisonment for a term which may extend to two years, or with fine which may extend to one lakh rupees, or with both.

**Punishment:** Imprisonment of a term of which may extend to two Years or fine may extend to 1 lakh rupees or with both.

**10. Publication For Fraudulent Purpose:**

**Section 74** provides that-



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Whoever knowingly creates, publishes or otherwise makes available a Digital Signature Certificate for any fraudulent or unlawful purpose shall be punished with imprisonment for a term which may extend to two years, or with fine which extends to one lakh rupees, or with both.

Explanation: This section prescribes punishment for the following acts:

- Knowingly creating a digital signature certificate for any
- fraudulent purpose or,
- unlawful purpose.

**Punishment:** Imprisonment for a term up to two years or fine up to one lakh or both.

**11. Act to apply for offense or contravention committed outside India**

Section 75 provides that-

- Subject to the provisions of sub-section
- the provisions of this Act shall apply also to any offense or contravention committed outside India by any person irrespective of his nationality.
- For the purposes of sub-section (1), this Act shall apply to an offense or Contravention committed outside India by any person if the act or conduct constituting the offense or contravention involves a computer, computer system or computer network located in India.

**Explanation:** This section has a broader perspective including cyber crime, committed by cyber criminals, of any nationality, any territoriality.

**Power to investigate offenses:**

- **Section 78** provides that – Notwithstanding anything contained in the **Code of Criminal Procedure, 1973**, a police officer not below the rank of Deputy Superintendent of Police shall investigate any offense under this Act.

**Advantages:**

Some advantages of the application of the IT Act 2000 are :-

- Helpful to promote e-commerce.
- Enhance the corporate business.
- Filling online forms.
- High penalty for cyber crime.



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Though it has many advantages, it has been misused by many people in order to gain themselves or for the sake or otherwise to harm others.

**Answer 9: Importance of Security Policies relating to Mobile Computing Devices:**

Growth of mobile devices used makes the cyber security issue harder than what we would tend to think. People (especially, the youth) have grown so used to their mobiles that they are treating them like wallets! For example, people are storing more types of confidential information on mobile computing devices than their employers or they themselves know; they listen to music using their hand-held devices One should think about not to keep credit card and bank account numbers, passwords, confidential E-Mails and strategic information about organization. Imagine the business impact if mobile or laptop was lost or stolen, revealing sensitive customer data such as credit reports, social security numbers (SSNs) and contact information.

**Operating Guidelines for Implementing Mobile Device Security Policies**

Through the following steps we can reduce the risk when mobile device lost or stolen

1. Determine whether the employees in the organization need to use mobile computing devices or not.
2. Implement additional security technologies like strong encryption, device passwords and physical locks.
3. Standardize the mobile computing devices and the associated security tools being used with them.
4. Develop a specific framework for using mobile computing devices.
5. Maintain an inventory so that you know who is using what kinds of devices.
6. Establish patching procedures for software on mobile devices.
7. Label the devices and register them with a suitable service.
8. Establish procedures to disable remote access for any mobile.
9. Remove data from computing devices that are not in use
10. Provide education and awareness training to personnel using mobile devices.

**Organizational Policies for the Use of Mobile Hand-Held Devices**

There are many ways to handle the matter of creating policy for mobile devices.

- **One** way is creating a distinct mobile computing policy.
- **Another** way is including such devices under existing policy.
- Organizations are heavily dependent upon a mobile workforce with access to information, no matter



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where they travel.

- However, this mobility is putting organizations at risk of having a data breach (Violation) if a laptop containing sensitive information is lost or stolen.
- Hence, physical security is very important to protect the information on the employees' laptops.

**Physical security countermeasures are as follows**

- **Cables and hardwired locks:** The most cost-efficient and ideal solution to safeguard any mobile device is securing with cables and locks, specially designed for laptops.
- **Laptop safes: Safes made of polycarbonate** – the same material that is used in bulletproof windows, police riot shields and bank security screens – can be used to carry and safeguard the laptops
- **Motion sensors and alarms:** Alarms and motion sensors are very efficient in securing laptops.
- **Warning labels and stamps:** Warning labels containing tracking information and identification details can be fixed onto the laptop to deter aspiring thieves. These labels cannot be removed easily and are a low-cost solution to a laptop theft.
- keeping the laptop close to oneself wherever possible.
- Carrying the laptop in a different and unobvious bag
- Creating the awareness among the employees about the sensitive information contained in the laptop.
- Making a copy of the purchase receipt of laptop.
- Installing encryption software to protect information stored on the laptop
- Using personal firewall software to block unwanted access and intrusion.
- Updating the antivirus software regularly.
- Tight office security using security guards and securing the laptop by locking it down in lockers when not in use.
- Never leaving the laptop unattended in public places.
- Disabling IR ports and wireless cards when not in use.
- Choosing a secure OS.
- Registering the laptop with the laptop manufacturer to track down the laptop in case of theft.
- Disabling unnecessary user accounts and renaming the administrator account.
- Backing up data on a regular basis.



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**A few logical access controls are as follows:**

1. Protecting from malicious programs/attackers/social engineering.
2. Avoiding weak passwords/open access.
3. Monitoring application security and scanning for vulnerabilities.
4. Ensuring that unencrypted data/unprotected file systems do not pose threats.
5. Proper handling of removable drives/storage mediums/unnecessary ports.
6. Password protection through appropriate passwords rules and use of strong passwords.
7. Locking down unwanted ports/devices.
8. Regularly installing security patches and updates.
9. Installing antivirus software/firewalls/intrusion detection system (IDSs).
10. Encrypting critical file systems.



**Swami Keshvanand Institute of Technology, Management  
& Gramothan, Ramnagar, Jagatpura, Jaipur-302017**

**Analysis of Question Paper Extra Mid Term Examination-2022-23**

Branch : ECE

Semester/Session: VII/2022-23

Max Marks: 24

Subject Code: 7CS6-60.2 Subject: Cyber Security

Duration: 90 Minutes

**A. Distribution of Course Outcome and Bloom's Taxonomy in Question Paper**

Q.No	Questions	Marks	CO	BL
1	Define cyber stalking?	2	1	1
2	Define Phishing and spamming.	2	1	1
3	State 5 cybercrimes which can happen against organization.	2	1	1
4	Write down the traditional and modern technique of credit card fraud.	2	2	1
5	Explain the cloud computing and services provided by Cloud Computing?	4	3	2
6	Botnets are known as fuel for cybercrimes. Explain Botnet architecture.	4	2	2
7	Define Cyber criminals. Write down the cybercriminal attack technique.	4	1	2
8	Explain the structure and offenses under Information Technology Act 2000.	8	2	2
9	Explain organizational security policies as measures in mobile computing era.	8	3	2

**BL – Bloom's Taxonomy Levels**

(1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 - Creating)

**CO – Course Outcomes**

After completion of this course, students will be able to –

CS6-60.2.1	Understand the various tools and methods used in cybercrime.
CS6-60.2.2	Identify risk management processes, risk treatment methods, organization of information security.
CS6-60.2.3	Classify cyber security solutions and information assurance.
CS6-60.2.4	Examine software vulnerabilities and security solutions to reduce the risk of exploitation.
CS6-60.2.5	Analyze the cyber security needs of an organization.





**Analysis of Question Paper Extra Mid Term Examination-2022-23**

Branch : ECE

Semester/Session: VII/2022-23

Max Marks: 24

Subject Code: 7CS6-60.2 Subject: Cyber Security

Duration: 90 Minutes

**B. Questions and Course Outcomes (COs) Mapping in terms of correlation**

CO	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
CO1	2	2	2						
CO2				2		3	3	3	
CO3					3				3
CO4									
CO5									

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

**C. Mapping of Bloom's Level and Course Outcomes with Question Paper**

Bloom's Level Mapping		CO Mapping	
Bloom's Level	Percentage	CO	Percentage
BL1	16.67	CO1	44.44
BL2	83.33	CO2	33.33
BL3	-	CO3	22.22
BL4	-	CO4	-
BL5	-	CO5	-
BL6	-		-

Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur  
B.Tech IV Year VII Semester (Session 2022-2023)

Department: ECE

CO's Attainment (Theory Mid Term : I)  
Faculty Name: Dr. Praveen Kumar Jain

Course Name with CODE: Cyber Security (7CS6-60.2)

Class: 8-EC (Section-A)

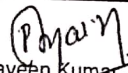
I-MID TERM EVALUATION

S. NO.	ROLL NO	PART →	A				B			C		Total (24)	Assignment	Total (30)
		Note →	Attempt All				Attempt Any two			Attempt any one				
		QUESTION NO. →	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9			
		COURSE OUTCOME(S) SATISFIED →	CO1	CO1	CO4	CO1	CO1	CO4	CO4	CO4	CO1			
		MAXIMUM MARKS →	2	2	2	2	4	4	4	8	8			
		MINIMUM QUALIFYING MARKS (50%) →	1	1	1	1	2	2	2	4	4			
		NAME OF STUDENT ↓												
			AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	0
1	14ESKEC749	Saurabh Kumar	1	2	1.5	1	3	-	0.5	1	-	10	6	16
2	19ESKEC001	Aarush Goyal	1	1	2	2	4	4	-	6	-	20	6	26
3	19ESKEC002	Abhinav Mishra	1	1	2	0	3	-	4	4		15	6	21
4	19ESKEC003	Abhinav Singh	2	1	2	1	4	4		6		20	6	26
5	19ESKEC004	Adish Jain	1	2	2	2	3	2		5		17	6	23
6	19ESKEC005	Aditya Garg	1	2	1	1	2		2	1		10	6	16
7	19ESKEC006	Aditya Gupta	2	2	1	1	4	3		6		19	6	25
8	19ESKEC007	Akshita Patidar	1	2	2	2		2	4	6		19	6	25
9	19ESKEC008	Aman Khan	1	2	2	1	2		3			11	6	17
10	19ESKEC009	Aman Saini	2	2	2	2	4	4			7	23	6	29
11	19ESKEC010	Amit Kumar	1	2	0	1	1		1			6	6	12
12	19ESKEC011	Amit Singh	1	0.5	2	1	1		2		2	10	6	16
13	19ESKEC013	Anjali Sharma	1.5	1.5	1	2	3	1		7		17	6	23
14	19ESKEC014	Ankit Sharma	2	2	2	2	3	2		5		18	6	24
15	19ESKEC015	Ankur Sharma	1	2	1.5	2	4	2		7		20	6	26
16	19ESKEC016	Ansh Gupta	1	2	2	2	4	4		6		21	6	27
17	19ESKEC017	Ansh Khandelwal	1	1	2	2	4	2		6		18	6	24
18	19ESKEC018	Anshika Khandelwal	2	2	2	2	4		4	6		22	6	28
19	19ESKEC019	Anshul Sisodiya	1.5	2	1.5	1	3		3	5		17	66	83
20	19ESKEC020	Archit Bajpai	1	2	1	1	2		3	6		16	6	22
21	19ESKEC021	Arpit Agrawal	2	1	2	2	4	4		6		21	6	27
22	19ESKEC022	Arpit Jain	2	2	2	2	3		4		4	19	6	25
23	19ESKEC023	Aryaman Chaudhary	1	1	0	1	3		3		4	13	6	19
24	19ESKEC024	Aryan	1	2	2	2	4		4	2		17	6	23
25	19ESKEC026	Arzoo Jalendra	2	2	2	2	4		4	5		21	6	27
26	19ESKEC027	Ashima Mehta	1.5	2	2	2	4		2.5	5		19	6	25
27	19ESKEC028	Ashish Sharma	2	2	2	2	4		4	7		23	6	29
28	19ESKEC030	Avadhesh Chasta										AB	NS	0
29	19ESKEC031	Avdesh Behl	2	2	2	2	3	3		5		19	6	25
30	19ESKEC032	Avinash Gupta	1	2	2	1	2.5	2.5		1		12	6	18
31	19ESKEC033	Bhanu Pratap Singh										AB	NS	0
32	19ESKEC034	Bhavesh Ghorela	2	2	2	1.5	4		4	5		21	6	27
33	19ESKEC035	Bhavya Anand	1	2	2	2	4		4	6.5		22	6	28
34	19ESKEC037	Debopam Sinha	1	2	2	2	4	4		6		21	6	27
35	19ESKEC038	Deepanshu Maheshwari	0.5	1	1	1					4	4	6	10
36	19ESKEC039	Deepesh Gupta	1	2	2	2	4		4	7		22	6	28
37	19ESKEC040	Devanshi Dadhich	2	2	2	2	4		4	7		23	6	29
38	19ESKEC041	Devendra Kaur	2	1	2	2	4		3	5		19	6	25
39	19ESKEC042	Divya Ramani	2	1.5	1	1	3		2	3		14	6	20
40	19ESKEC043	Durgesh Mishra	2	2	1.5	1.5		2	4	4		17	6	23
41	19ESKEC044	Eshita Goyal	1	2	2	2	3	4		4		18	6	24
42	19ESKEC045	Garvit Tambi	1	2	2	1	4		4	4		18	6	24
43	19ESKEC047	Gaurav Sharma	2	2	2	2	3	3		6		20	6	26
44	19ESKEC048	Gitesh Khatri	2	2	2	1	4	3		5		19	6	25
45	19ESKEC049	Hansika Agarwal	2	1	1	2	4	4		6		20	6	26
46	19ESKEC050	Hanu Singh Kumawat	2	2	2	2	3			6		17	6	23
47	19ESKEC051	Hardik Tyagi	1	1	1	2	3		3		4	15	6	21
48	19ESKEC052	Harsh Kumar	1	1	1	2	2	1		3		11	6	17
49	19ESKEC053	Harsh Trivedi	2	2	2	1	4	4		6		21	6	27
50	19ESKEC054	Harsh Vardhan	2	2	1	2	3		3	4		17	6	23
51	19ESKEC055	Harshit Sharma	2	2	1	2	3		3	4		17	6	23

Total No. of DEBARRED (DB)	0	0	0	0	0	0	0	0	0	0	0	0
Total No. of ABSENT (AB)	1	1	1	1	1	1	1	1	1	1	1	2
Total Students Appeared for Exam (A)	48	48	48	48	48	48	48	48	48	48	48	48
Total Students Attempted the Question (A)	48	48	48	48	45	22	26	35	12			48
No. of Students scored >=50% marks (B)	47	47	46	47	43	20	24	30	8			48
Percentage Attainment of Criterion (B/A)	98%	98%	96%	98%	96%	91%	92%	86%	67%			100%
Attainment of CO-1	3	3	3									100%
Attainment of CO-2				3		3	3	3				
Attainment of CO-3					3				3			
Attainment of CO-4												100%
Attainment of CO-5												

Criterion of Percentage for CO Attainment Level	Attainment Level
Percentage attainment less than 50%	0
Percentage attainment 50%- 59.99%	1
Percentage attainment 60%-69.99%	2
Percentage attainment Above and equal to 70%	3

Final attainment		
Attainment of CO-1		3
Attainment of CO-2		3
Attainment of CO-3		3

  
 Dr. Praveen Kumar Jain  
 6/10/2022

Upon successful completion of this course, students will be able to:

MID TERM EVALUATION												Section-B		
S.NO.	ROLL NO	PART →	A				B			C		Total (24)	Assignment (6)	Total (30)
		Note →	Attempt All				Attempt Any Two			Attempt Any One				
		QUESTION NO. →	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9			
		COURSE OUTCOME(S) SATISFIED →	CO1	CO1	CO1	CO2	CO3	CO2	CO1	CO2	CO3			
		MAXIMUM MARKS →	2	2	2	2	4	4	4	8	8			
		MINIMUM QUALIFYING MARKS (50%) →	1	1	1	1	2	2	2	4	4			
NAME OF STUDENT ↓														
1	19ESKEC056	HARSHI VERMA	2	2	2	2	3	NA	4	NA	2	17	5	22
2	19ESKEC057	HIMANSHU VASISTHA	2	2	2	2	4	NA	4	5	NA	21	5	26
3	19ESKEC058	HITEN JAIN	1	2	1	2	4	NA	4	4	NA	18	5	23
4	19ESKEC059	JAI VEER SINGH	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	AB
5	19ESKEC060	JAY SHRIVASTAVA	2	2	2	2	4	NA	3	3	NA	18	5	23
6	19ESKEC061	JAYANT KUMAR MEHRA	2	2	2	2	NA	NA	2	NA	NA	10	6	16
7	19ESKEC062	JIGYASA KARODIWAL	2	2	2	2	4	4	NA	5	NA	21	6	27
8	19ESKEC063	KANIKA SINGHAL	2	2	2	2	4	NA	4	5	NA	21	6	27
9	19ESKEC065	KARTIK SHARMA	2	2	2	2	2	NA	4	2	NA	16	5	21
10	19ESKEC066	KAVISH JARADI	2	2	NA	2	3	3	NA	4	NA	16	5	21
11	19ESKEC067	KESHAV MEENA	2	2	2	2	2	3	NA	NA	3	16	5	21
12	19ESKEC069	KHUSHI SA RATHORE	1	1	2	2	4	NA	4	0	NA	15	6	21
13	19ESKEC071	KRATIK JAMBOO KHANDELWAL	0	0	0	0	3	NA	2	NA	NA	5	5	10
14	19ESKEC072	KUMARI RIDHI	2	2	2	2	NA	4	4	7	NA	23	6	29
15	19ESKEC073	KUMARI SIDHI	2	2	2	2	NA	4	4	7	NA	23	6	29
16	19ESKEC074	KUNAL VERMA	2	2	2	2	4	NA	3	5	NA	20	6	26
17	19ESKEC075	KUSUM SHARMA	2	2	2	2	4	NA	3	NA	5	20	5	25
18	19ESKEC076	LOKESH PATIDAR	2	2	2	2	4	2	NA	NA	2	16	6	22
19	19ESKEC077	MALIKA KHANDELWAL	2	2	2	2	4	NA	4	NA	5	21	6	27
20	19ESKEC078	MANAN PUROHIT	2	2	1	2	2	NA	2	NA	NA	11	5	16
21	19ESKEC079	MANISH SAINI	1	2	1	2	2	NA	2	NA	3	13	5	18
22	19ESKEC080	MANISHA BALANI	2	2	2	2	4	NA	4	5	NA	21	6	27
23	19ESKEC081	MANOJ GARG	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	AB
24	19ESKEC082	MANOVIRAJ SINGH SHEKHAWAT	2	2	2	2	4	3	NA	5	NA	20	5	25
25	19ESKEC083	MANSHA MODI	2	2	2	2	4	3	NA	4	NA	19	6	25
26	19ESKEC084	MANSI SHARMA	2	2	2	2	4	3	NA	4	NA	19	5	24
27	19ESKEC085	MEHAK JAIN	2	2	2	2	3	3	NA	NA	5	19	6	25
28	19ESKEC087	MOHIT AGARWAL	2	2	2	2	2	NA	3	NA	1	14	5	19
29	19ESKEC088	MOIN ALI	2	2	2	2	4	4	NA	6	NA	22	6	28

31	19ESKEC089	MUDIT DIINGRA	1	2	2	1	2	NA	4	NA	NA	12	5	17
32	19ESKEC090	MULKIT SAIN	2	2	2	2	4	NA	4	NA	7	23	5	28
33	19ESKEC091	NILHA MAHESHWARI	2	2	2	2	4	3	NA	6	NA	21	6	27
34	19ESKEC092	NEHA MAHESHWARI	2	2	2	2	4	NA	3	3	NA	18	6	24
35	19ESKEC093	NISHANT KUMAR	2	2	2	2	4	NA	4	NA	2	18	5	23
36	19ESKEC094	NITIN SHARMA	2	2	2	2	4	4	NA	6	NA	22	6	28
37	19ESKEC096	PARUL JAIN	2	2	2	2	4	3	NA	4	NA	19	6	25
38	19ESKEC097	POOJA JANGID	2	2	2	2	4	NA	4	NA	4	20	5	25
39	19ESKEC098	PRAKHAR JAIN	2	2	2	2	4	NA	3	NA	2	17	5	22
40	19ESKEC099	PRADEEK THOLIYA	2	2	1	2	4	NA	4	3	NA	18	5	23
41	19ESKEC100	PRATIK SINGH	2	2	2	2	4	3	NA	3	NA	18	6	24
42	19ESKEC102	PRIYANSHU LOHAR	2	2	2	2	4	NA	4	NA	6	22	6	28
43	19ESKEC103	PRIYANSHU SHARMA	2	1	2	1	2	2	NA	1	NA	11	5	16
44	19ESKEC104	PULKIT GUPTA	2	2	2	1	3	3	NA	2	NA	15	5	20
45	19ESKEC106	RAGHAV AGARWAL	2	2	2	NA	4	2	NA	3	NA	15	5	20
46	19ESKEC107	RAGHVENDER SINGH CHAUHAN	2	2	2	2	4	4	NA	NA	5	21	6	27
47	19ESKEC108	RAHUL KUMAR BALAI	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	AB
48	19ESKEC109	RAJAT GUPTA	2	2	2	2	4	NA	4	3	NA	19	5	24
49	19ESKEC110	RAKSHITA AGARWAL	2	2	2	2	4	NA	4	6	NA	22	6	28
49	19ESKEC111	RASHI KINRA	2	2	2	2	4	4	NA	7	NA	23	6	29

Total No. of DEBARRED (DB)			0	0		0	0	0	0	0	0			
Total No. of ABSENT (AB)			3	3	3	3	3	3	3	3	3			
Total Students Appeared for Exam			46	46	46	46	46	46	46	46	46			
Total Students Attempted the Question (A)			46	46	45	45	43	20	28	28	14			
No. of Students scored >=50% marks (B)			45	45	44	44	43	20	28	18	7			
Percentage Attainment of Criterion (B/A)			97.83	97.83	97.78	97.78	100.00	100.00	100.00	64.29	50.00			
CO Attainment Level			3	3	3	3	3	3	3	2	1			
Attainment of CO-1				3										
Attainment of CO-2				3										
Attainment of CO-3				3										
Attainment of CO-4														
Attainment of CO-5														
Criterion of Percentage for CO Attainment Level			Attainm ent Level											
Percentage attainment Below 50%			0											
Percentage attainment 50%-59.99%			1											
Percentage attainment 60%-69.99%			2											
Percentage attainment Above and equal to 70%			3											

Manju Choudhary

Faculty name with signature

*Manju*

**Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur**

**B.Tech IV Year VII Semester (Session 2022-2023)**

CO's Attainment (Theory Mid Term : I)

Department: ECE

Faculty Name: Manju Choudhary

Course Name with CODE: Cyber Security (7CS6-60.2)

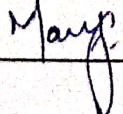
Upon successful completion of this course, students will be able to:

**MID TERM EVALUATION**

**Section-C**

S.NO	ROLL NO	PART →	A				B			C		Total (24)	Assignment (6)	Total (30)
		Note→	Attempt All				Attempt Any Two			Attempt Any One				
		QUESTION NO. →	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9			
		COURSE OUTCOME(S) SATISFIED →	CO1	CO1	CO1	CO2	CO3	CO2	CO1	CO2	CO3			
		MAXIMUM MARKS	2	2	2	2	4	4	4	8	8			
		MINIMUM QUALIFYING MARKS (50%) →	1	1	1	1	2	2	2	4	4			
		NAME OF STUDENT ↓												
1	19ESKEC112	Rashi Sharma	2	2	2	2	4	4	NA	4	NA	20	6	26
2	19ESKEC113	Ritrik Rohra	2	2	2	1	2	NA	3	2	NA	14	6	20
3	19ESKEC115	Roshan Kumar Jha	2	2	2	2	2	4	NA	4	NA	18	6	24
4	19ESKEC116	Rudra Pratap Singh	2	1	2	2	2	3	NA	NA	3	15	5	20
5	19ESKEC117	Saloni Chhparwal	2	2	2	2	3	4	NA	NA	4	19	6	25
6	19ESKEC118	Samriti Devi	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	AB
7	19ESKEC119	Sanjana Jawaria	2	2	2	2	4	4	NA	6	NA	22	6	28
8	19ESKEC120	Sanjay Kumar	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	AB
9	19ESKEC121	Sarim Ur Rehman	2	2	2	1	4	NA	4	3	NA	18	6	24
10	19ESKEC122	Sarthak Bhatia	2	2	2	2	3	NA	4	4	NA	19	5	24
11	19ESKEC123	Sarthak Sharma	2	2	2	2	4	4	NA	NA	4	20	6	26
12	19ESKEC124	Saurabh Choudhary	2	2	1	2	2	NA	4	6	NA	19	5	24
13	19ESKEC125	Saurabh Singh Jat	2	2	1	1	3	4	NA	3	NA	16	5	21
14	19ESKEC126	Sharad Sourabh Jha	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	6	6

15	19ESKEC127	Shiv Pratap Singh Chouhan	2	2	2	2	4	NA	4	NA	2	18	5	23
16	19ESKEC128	Shivam Garg	2	2	1	2	2	NA	1	0	NA	10	6	16
17	19ESKEC129	Shivansh Dosi	2	2	1	2	NA	3	3	1	NA	14	6	20
18	19ESKEC130	Shubham Jain	2	2	2	2	4	NA	4	NA	6	22	6	28
19	19ESKEC131	Siddharth Harshit	2	2	2	2	NA	3	3	NA	4	18	6	24
20	19ESKEC132	Siddhi Saxena	2	2	2	1	4	4	NA	5	NA	20	6	26
21	19ESKEC133	Simran Rathore	2	2	2	2	2	NA	4	NA	1	15	6	21
22	19ESKEC134	Somil Jain	2	2	2	2	4	3	NA	6	NA	21	5	26
23	19ESKEC135	Sonali Nishad	2	2	2	1	2	NA	3	NA	NA	12	6	18
24	19ESKEC136	Soumya Agarwal	2	2	2	2	4	3	NA	NA	5	20	6	26
25	19ESKEC137	Sourabh Vyas	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	AB
26	19ESKEC138	Suhani Jain	2	2	2	2	4	4	NA	6	NA	22	6	28
27	19ESKEC139	Sumit Gupta	2	2	2	2	2	NA	1	1	NA	12	5	17
28	19ESKEC140	Tanisha Jain	2	2	2	2	4	NA	4	NA	5	21	6	27
29	19ESKEC141	Tanu Gambhir	2	2	2	2	4	NA	4	NA	7	23	6	29
30	19ESKEC143	Tanvi Nemnani	2	2	2	1	3	NA	4	NA	7	21	6	27
31	19ESKEC145	Tushar Mittal	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	6	6
32	19ESKEC146	Udiesha Gautam	2	2	2	2	4	4	NA	7	NA	23	6	29
33	19ESKEC147	Utsav Jain	2	2	2	2	NA	3	4	NA	5	20	6	26
34	19ESKEC148	V Vighnesh Rajan	2	2	2	2	3	NA	3	NA	3	17	6	23
35	19ESKEC149	Vansh Agrawal	2	2	2	2	3	NA	4	2	NA	17	5	22
36	19ESKEC150	Vidhi Sukhnani	2	2	2	2	4	4	NA	NA	4	20	5	25
37	19ESKEC151	Vikas Mittal	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	6	6
38	19ESKEC152	Vinayak Gupta	2	2	2	2	3	NA	4	NA	6	21	5	26
39	19ESKEC153	Vishal Dandia	2	2	2	2	3	NA	4	NA	4	19	6	25
40	19ESKEC155	Yaman Kumar Malik	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	6	6
41	19ESKEC156	Yash Dubey	2	2	2	2	4	NA	4	NA	5	21	5	26
42	19ESKEC157	Yash Raj Mishra	2	2	2	2	3	NA	3	NA	NA	14	5	19

43	19ESKEC158	Yatharth Jain	2	2	2	2	4	2	NA	1	NA	15	6	21
44	19ESKEC159	Yayati	AB	AB	AB	AB	AB	AB	AB	AB	AB	0	6	6
45	19ESKEC160	Yogesh Sharma	2	NA	2	2	4	NA	4	NA	3	17	6	23
46	19ESKEC300	Manish Manohar Chandwani	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	6	6
47	19ESKEC301	Mohit Kumawat	2	2	2	2	3	NA	4	5	NA	20	6	26
48	19ESKEC302	Smriti Sharma	2	2	2	2	NA	4	4	NA	5	21	6	27
49	19ESKEC303	Gaurav Kumar	2	2	2	2	4	NA	4	NA	3	19	6	25
50	19ESKEC304	Gaurav Singh Chouhan	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	5	5
Total No. of DEBARRED (DB)			0	0	0	0	0	0	0	0	0			
Total No. of ABSENT (AB)			10	10	10	10	10	10	10	10	10			
Total Students Appeared for Exam			40	40	40	40	40	40	40	40	40			
Total Students Attempted the Question (A)			40	39	40	40	36	18	26	18	20			
No. of Students scored >=50% marks (B)			40	39	40	40	36	18	24	10	14			
Percentage Attainment of Criterion (B/A)			100.00	100.00	100.00	100.00	100.00	100.00	92.31	55.56	70.00			
CO Attainment Level			3	3	3	3	3	3	3	1	3			
Attainment of CO-1				3										
Attainment of CO-2				3										
Attainment of CO-3				3										
Attainment of CO-4				NIL										
Attainment of CO-5				NIL										
Criterion of Percentage for CO Attainment Level			Attainment Level											
Percentage attainment Below 50%			0											
Percentage attainment 50%-59.99%			1											
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Percentage attainment Above and equal to 70%			3											
Manju Choudhary														
Faculty name with signature 														





**Swami Keshvanand Institute of Technology,  
Management & Gramothan, Jaipur**  
**I Mid Term Examination, Nov.-2022**

<b>Semester:</b>	V	<b>Branch:</b>	EC
<b>Subject:</b>	EW	<b>Subject Code:</b>	5EC4-02
<b>Time:</b>	1.5 Hours	<b>Maximum Marks:</b>	20
<b>Session (I/II/III): I</b>			

**Note:** Smith chart as a Supplementary material provided during examination

**PART A (short-answer type questions)**

(All questions are compulsory)

(3\*2=6)

**Q.** A telephone line has  $R=40\Omega/\text{km}$ ,  $L=80\text{mH}/\text{km}$ ,  $G=0$  and  $C=15\ \mu\text{F}/\text{km}$ . At  $f=2$  kHz obtains

(a) The characteristic impedance of the line (b) The propagation constant

**Q.2** Write Maxwell's equation in differential and integral form.

**Q.3** Explain the physical significance (cases) of relative permittivity in a conducting ( $\epsilon_{rc}$ ) medium for dielectric and conducting behaviour.

**PART B (Analytical/Problem solving questions)**

(Attempt any 2 Questions)

(2\*4=8)

**Q.4** Derive the voltage and current equations for transmission line. Also deduce the characteristics impedance for loss less and lossy medium

**Q.5** Derive the boundary conditions for electric field using Maxwell equations at the interface of two dielectric mediums.

**Q.6** A uniform plane wave traveling in a medium having dielectric constant 9, has peak electric field of 20 V/m. The frequency of the wave is 1 GHz. Find the wavelength and peak magnetic field of the wave. If at some location ( $z=0$ ) and some instant ( $t=0$ ), the electric field is 8V/m, find the magnitudes of the electric

field and magnetic field at  $z = 3\text{m}$  and  $t = 80\text{ msec}$ . Assume that wave is moving in  $z$ -direction.

**PART C (Descriptive/Analytical/Problem solving/Design question)**  
(Attempt any 1 Question) **(1)**

**Q.7** State Poynting Theorem. Derive the expression for net outward power through the surface.

**Q.8** A lossless transmission line with characteristic impedance  $50\text{ ohm}$  is  $30\text{ m}$  long and operates at  $2\text{ MHz}$ . The line is terminated with a load of  $60 + j80$ . Calculate (Using Smith Chart)

- (a) VSWR
- (b) Position of First voltage Minima
- (c) Distance of first stub for impedance matching.



**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): I	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

**PART A (short-answer type questions)**  
(All questions are compulsory)

(3\*2=6)

Q.1 A telephone line has  $R=40\Omega/\text{km}$ ,  $L=80\text{mH}/\text{km}$ ,  $G=0$  and  $C=15\mu\text{F}/\text{km}$ . At  $f=2\text{ kHz}$  obtains  
(a) The characteristic impedance of the line (b) The propagation constant

Answer:

$$Z_0 = \frac{\sqrt{R + j\omega L}}{\sqrt{G + j\omega C}} = \frac{\sqrt{40 + j2 * 3.14 * 2 * 10^3 * 80 * 10^{-3}}}{\sqrt{0 + j2 * 3.14 * 2 * 10^3 * 15 * 10^{-6}}}$$

$$Z_0 = \sqrt{5329 - j212.3}$$

$$\gamma = \sqrt{(R + j\omega L)(G + j\omega C)}$$

$$\gamma = \sqrt{-189.3 + j7.53}$$

Q.2 Write Maxwell's equation in differential and integral form.

Answer: Differential form

S. No.	Maxwell Equation	Remarks
1.	$\nabla \cdot D = \rho_v$	Gauss's law
2.	$\nabla \cdot B = 0$	Nonexistence of isolated magnetic charge
3.	$\nabla \times E = -\frac{\partial B}{\partial t}$	Faraday's law
4.	$\nabla \times H = J + \frac{\partial D}{\partial t}$	Ampere's circuit law

Integral form:

$$\oint_S D \cdot ds = \int_v \rho_v dv$$

$$\oint_S B \cdot ds = 0$$

$$\oint_L E \cdot dl = -\frac{\partial}{\partial t} \int_S B \cdot ds$$

$$\oint_L H \cdot dl = \int_S \left( J + \frac{\partial D}{\partial t} \right) \cdot dS$$



**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

**Q.3 Explain the physical significance (cases) of relative permittivity in a conducting ( $\epsilon_{rc}$ ) medium for dielectric and conducting behavior.**

**Answer-** Physical Significance: The relative permittivity (dielectric constant) of a conducting medium for dielectric is always complex and it is a function of frequency. The behavior of medium is now become frequency dependent.

Case 1: if  $\frac{\text{Conduction Current Density}}{\text{Displacement Current Density}} = \frac{\sigma}{\omega\epsilon_0\epsilon_r} \gg 1$   
=> medium is good Conductor

Case 2: if  $\frac{\text{Conduction Current Density}}{\text{Displacement Current Density}} = \frac{\sigma}{\omega\epsilon_0\epsilon_r} \ll 1$   
=> medium is good dielectric

Case 3: if  $\frac{\text{Conduction Current Density}}{\text{Displacement Current Density}} = \frac{\sigma}{\omega\epsilon_0\epsilon_r} \sim 1$   
=> medium can neither be called good conductor nor a good dielectric

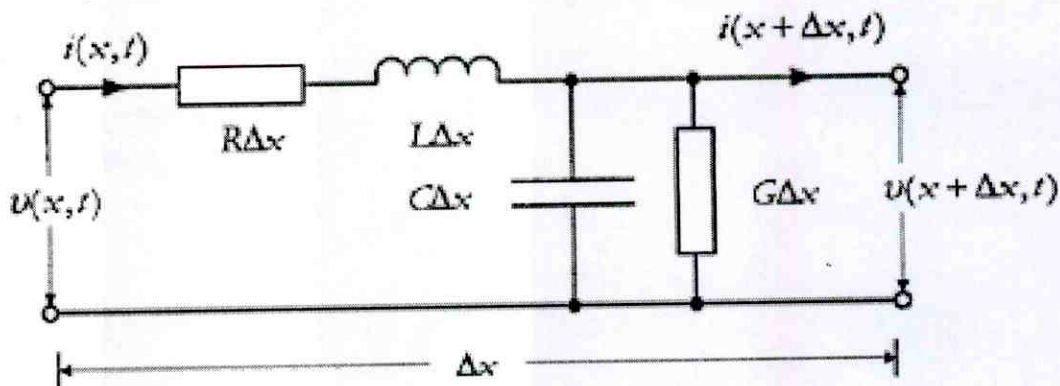
**PART B (Analytical/Problem solving questions)**  
(Attempt any 2 Questions)

(2\*4=8)

**Q.4 Derive the voltage and current equations for transmission line. Also deduce the characteristics impedance for loss less and lossy medium**

**Answer:** Voltage & Current equation for Transmission line

Let us consider a small section of a transmission line of length  $\Delta x$ . Let the voltage at the input be  $V$  and current at the input be  $I$ . Due to the voltage drop in the series arm, the output voltage will be different from the input voltage, say  $V + \Delta V$ . Similarly due to current through the capacitance and the conductance the output current will be different from the input through the current, say  $I + \Delta I$



Apply the KVL at Output Loop

The Voltage Across the  $G\Delta x$  and  $j\omega C\Delta x$  is  $(V + \Delta V)$



**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

$$V - (R\Delta X + j\omega L\Delta X)I - (V + \Delta V) = 0$$

Then we can write-

$$\Delta V = -(R\Delta X + j\omega L\Delta X)I \dots \dots \dots (1)$$

$$\frac{\Delta V}{\Delta X} = -(R + j\omega L)I \dots \dots \dots (2)$$

Apply KCL at shunt loop because current flow in series is same

$$I - (G\Delta X + j\omega C\Delta X)V - (I + \Delta I) = 0$$

$$\Delta I = -(G\Delta X + j\omega C\Delta X)V \dots \dots \dots (3)$$

By taking  $\Delta X$  common in equation (1) and (2) we can write-

$$\frac{\Delta I}{\Delta X} = -(G + j\omega C)V \dots \dots \dots (4)$$

Now if the lumped circuit model should be valid for arbitrarily high frequency (the analysis has to be carried out in the limit  $\Delta X \rightarrow 0$ ).

So from equation (3) and (4) we can write-

$$\lim_{\Delta X \rightarrow 0} \frac{\Delta V}{\Delta X} = \frac{dV}{dX} = -(R + j\omega L)I \dots \dots \dots (5)$$

$$\lim_{\Delta X \rightarrow 0} \frac{\Delta I}{\Delta X} = \frac{dI}{dX} = -(G + j\omega C)V \dots \dots \dots (6)$$

Differentiating eqn. (5) with respect to X we get-

$$\frac{d^2V}{dX^2} = -(R + j\omega L) \frac{dI}{dX} \dots \dots \dots (7)$$

From equation (6) and (7) we can write-

$$\frac{d^2V}{dX^2} = (R + j\omega L)(G + j\omega C)V \dots \dots \dots (8)$$

From equation (9), (10) and (11) we can write-

$$\frac{d^2V}{dX^2} = \gamma^2 V \dots \dots \dots (13)$$

$$\frac{d^2I}{dX^2} = \gamma^2 I \dots \dots \dots (14)$$

The general solution to the differential equations mentioned in equation (13) and (14) is-

$$V(X) = V^+ e^{-\gamma X} + V^- e^{\gamma X} \dots \dots \dots (15)$$



**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/H/HT): II	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

$$I(X) = I^+ e^{-\gamma X} + I^- e^{\gamma X} \dots \dots \dots (16)$$

Where  $V^+, V^-, I^+, I^-$  are the arbitrary complex constants which are to be evaluated from the boundary conditions, where it becomes clear later that  $e^{-\gamma X}$  wave is propagation in +X direction and  $e^{\gamma X}$  wave is propagating in -X Direction

**deduce the characteristics impedance for loss less and lossy medium**

Characteristics Impedance of Loss less Transmission Lines

$$Z_0 = \sqrt{\frac{(R + j\omega L)}{(G + j\omega C)}}$$

If  $R=G=0$

$$Z_0 = \sqrt{\frac{(j\omega L)}{(j\omega C)}}$$

$$Z_0 = \sqrt{\frac{L}{C}}$$

**lossy medium**

$R \ll \omega L, G \ll \omega C$

$$Z_0 = \sqrt{\frac{j\omega L \left( \frac{R}{j\omega L} + 1 \right)}{j\omega C \left( \frac{G}{j\omega C} + 1 \right)}}$$

$\frac{R}{j\omega L} \ll 1$       &  $\frac{G}{j\omega C} \ll 1$  so  $\frac{R}{j\omega L} = \approx 0$

$$Z_0 = \sqrt{\frac{L(0 + 1)}{C(0 + 1)}} = \sqrt{\frac{L}{C}}$$

**Q.5 Derive the boundary conditions for electric field using Maxwell equations at the interface of two dielectric mediums.**

Answer- Two dielectric mediums

To determine the boundary conditions, we need to use Maxwell's equations.



**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

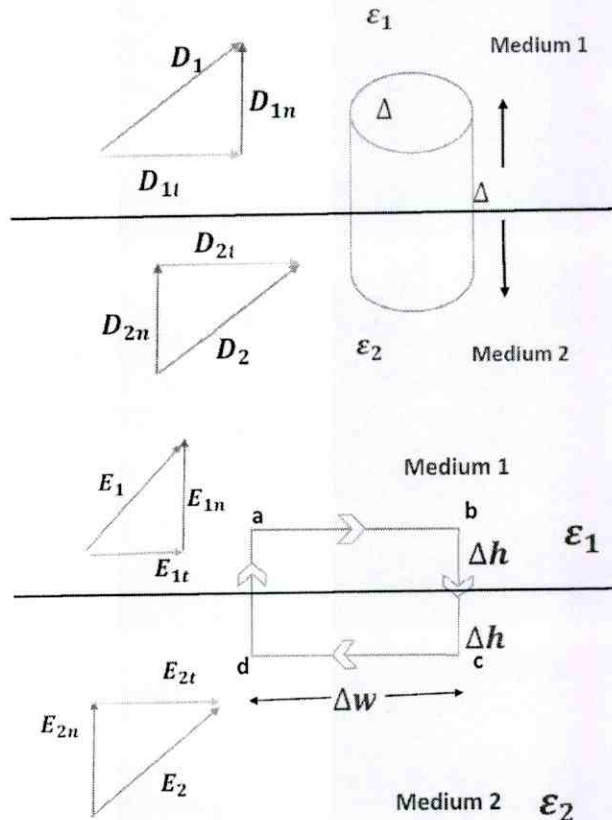
$$\oint_S D \cdot ds = Q_{enc}$$

$$\oint_L E \cdot dl = 0$$

Also we need to decompose the electric field intensity  $E$  into two orthogonal components:

$$E = E_t + E_n$$

Where  $E_t$  and  $E_n$  are, respectively, the tangential and normal components of  $E$  to the interface of interest. A similar decomposition can be done for the electric flux density  $D$ .



$$\oint_L E \cdot dl = 0$$

$$\oint_L E \cdot dl = \int_a^b E \cdot dl + \int_b^c E \cdot dl + \int_c^d E \cdot dl + \int_d^a E \cdot dl = 0$$

$$\int_a^b E \cdot dl = E_{1t} \Delta w$$



**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

$$\oint_b^c E \cdot dl = -(E_{1N} + E_{2N}) \frac{\Delta h}{2}$$
$$\oint_c^d E \cdot dl = -E_{2t} \Delta w$$
$$\oint_d^a E \cdot dl = (E_{1N} + E_{2N}) \frac{\Delta h}{2}$$
$$\oint_a^b E \cdot dl + \oint_b^c E \cdot dl + \oint_c^d E \cdot dl + \oint_d^a E \cdot dl = (E_{1t} - E_{2t}) \Delta w$$
$$(E_{1t} - E_{2t}) \Delta w = 0$$
$$E_{1t} = E_{2t}$$
$$\frac{D_{1t}}{\epsilon_1} = \frac{D_{2t}}{\epsilon_2}$$
$$\epsilon_2 D_{1t} = \epsilon_1 D_{2t}$$

Hence Proved

**Q. 6** A uniform plane wave traveling in a medium having dielectric constant 9, has peak electric field of 20 V/m. The frequency of the wave is 1 GHz. Find the wavelength and peak magnetic field of the wave. If at some location ( $z=0$ ) and some instant ( $t=0$ ), the electric field is 8V/m, find the magnitudes of the electric field and magnetic field at  $z= 3\text{m}$  and  $t= 80 \text{ msec}$ . Assume that wave is moving in  $z$ -direction.

Answer: The electric field of a wave travelling in  $+z$  direction can be written as:

$$E = 10 \cos(\omega t - \beta z + \phi)$$

(1)  $\omega = 2\pi f = 2\pi \times 10^9 \text{ rad/s}$

(2)  $\beta = \omega \sqrt{\mu\epsilon} = 2\pi \times 10^9 \sqrt{\mu_0 \epsilon_0 \sqrt{\epsilon_r}} = 20 \pi \text{ rad/m}$

(3) at  $z=0$  and  $t=0$ , Let say phase is  $\phi$

$$8 = 20 \cos(\phi) \Rightarrow \phi = \cos^{-1}\left(\frac{8}{20}\right) = 23.57^\circ$$

Intrinsic Impedance of the medium

$$\eta = \frac{\eta_0}{\sqrt{\epsilon_r}} = \frac{120 \pi}{\sqrt{9}} = 40\pi \text{ ohm}$$

The Magnetic Field is given by:





**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

$$H = \frac{E}{\eta} = \frac{20 \cos(2\pi \times 10^9 t - 20\pi z + 23.5^\circ)}{40\pi}$$

At  $z = 3 \text{ m}$ ,  $t = 80 \text{ ms}$

$$H = \frac{E}{\eta} = \frac{20 \cos(2\pi \times 10^9 t - 20\pi z + 23.5^\circ)}{40\pi} = \frac{20 \cos(2\pi \times 10^9 \times 80 \times 10^{-3} - 20\pi \times 3 + 23.5^\circ)}{40\pi}$$

$$H = \frac{E}{\eta} = \frac{20 \cos(1.6\pi \times 10^8 - 60\pi + 23.5^\circ)}{40\pi} = 0.145 \text{ A/m}$$

**PART C (Descriptive/Analytical/Problem solving/Design questions)**

(Attempt any 1 Question) (1\*6=6)

**Q.7 State Poynting Theorem. Derive the expression for net outward power through the surface.**

Answer: Poynting Theorem states that in a given volume, the stored energy changes at a rate given by the work done on the charges within the volume, minus the rate at which energy leaves the volume. According to Poynting theorem, the surface integral of  $P$  over a closed surface is equal to the total power leaving the closed surface. Poynting Theorem is strictly valid only for closed surface.

For the net outward power through the surface take the Maxwell equation

Let us take the Maxwell's equation:

$$\nabla \times E = -\frac{\partial B}{\partial t} = -\mu \frac{\partial H}{\partial t}$$
$$\nabla \times H = J + \frac{\partial D}{\partial t} = J + \epsilon \frac{\partial E}{\partial t}$$

We know, vector identity

$$\nabla \cdot (A \times C) = C \cdot (\nabla \times A) - A \cdot (\nabla \times C)$$

Where  $A$  and  $C$  are any two arbitrary identity.

$$\nabla \cdot (E \times H) = H \cdot (\nabla \times E) - E \cdot (\nabla \times H)$$

Using Maxwell's equation:

$$\nabla \cdot (E \times H) = H \cdot \left(-\mu \frac{\partial H}{\partial t}\right) - E \cdot \left(J + \epsilon \frac{\partial E}{\partial t}\right)$$
$$\nabla \cdot (E \times H) = H \cdot \left(-\mu \frac{\partial H}{\partial t}\right) - E \cdot \left(J + \epsilon \frac{\partial E}{\partial t}\right)$$



**Solution of Question Paper**  
**I Mid-Term Examination, Nov. -2022**

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

$$\frac{\partial (A.C)}{\partial t} = A \cdot \frac{\partial C}{\partial t} + C \cdot \frac{\partial A}{\partial t}$$

$$\frac{\partial (A.A)}{\partial t} = 2A \cdot \frac{\partial A}{\partial t}$$

$$A \cdot \frac{\partial A}{\partial t} = \frac{1}{2} \frac{\partial (A.A)}{\partial t} = \frac{1}{2} \frac{\partial |A|^2}{\partial t}$$

since  $J = \sigma E$ , and taking  $\sigma$  not a function of time.

$$\nabla \cdot (E \times H) = -\frac{\mu}{2} \frac{\partial |H|^2}{\partial t} - \frac{\epsilon}{2} \frac{\partial |E|^2}{\partial t} - \sigma |E|^2$$

$$\nabla \cdot (E \times H) = -\frac{\mu}{2} \frac{\partial |H|^2}{\partial t} - \frac{\epsilon}{2} \frac{\partial |E|^2}{\partial t} - \sigma |E|^2$$

Taking volume integral on the both side of above equation

$$\oint_v \nabla \cdot (E \times H) dv = \oint_v \left( -\frac{\mu}{2} \frac{\partial |H|^2}{\partial t} - \frac{\epsilon}{2} \frac{\partial |E|^2}{\partial t} - \sigma |E|^2 \right) dv$$

using the divergence theorem

$$\oint_s (E \times H) da = \oint_v -\frac{\mu}{2} \frac{\partial |H|^2}{\partial t} dv - \oint_v \frac{\epsilon}{2} \frac{\partial |E|^2}{\partial t} dv - \oint_v \sigma |E|^2 dv$$

$$\oint_s (E \times H) da = -\frac{\partial}{\partial t} \left\{ \oint_v \frac{\mu}{2} |H|^2 dv + \oint_v \frac{\epsilon}{2} |E|^2 dv \right\} - \oint_v \sigma |E|^2 dv$$

$$\oint_s (E \times H) da = -\frac{\partial}{\partial t} \left\{ \oint_v \frac{\mu}{2} |H|^2 dv + \oint_v \frac{\epsilon}{2} |E|^2 dv \right\} - \oint_v \sigma |E|^2 dv$$

$$\oint_s (E \times H) da = -\frac{\partial}{\partial t} \left\{ \oint_v \frac{\mu}{2} |H|^2 dv + \oint_v \frac{\epsilon}{2} |E|^2 dv \right\} - \oint_v \sigma |E|^2 dv$$

$$\text{Net outward Power } W = \oint_s (E \times H) da$$

Since the surface integral of  $(E \times H)$  gives the total power flow from the surface, the quantity  $(E \times H)$ , therefore, represents the power density on the surface of the volume.

**Q.8 A lossless transmission line with characteristics impedance 50 ohm is 30 metres long and operates at 2 MHz. The line is terminated with a load of  $60 + j80$  ohms. Calculate (Using Smith Chart)**

(a) VSWR

(b) Position of First voltage Minima

(c) Distance of first stub for impedance matching.



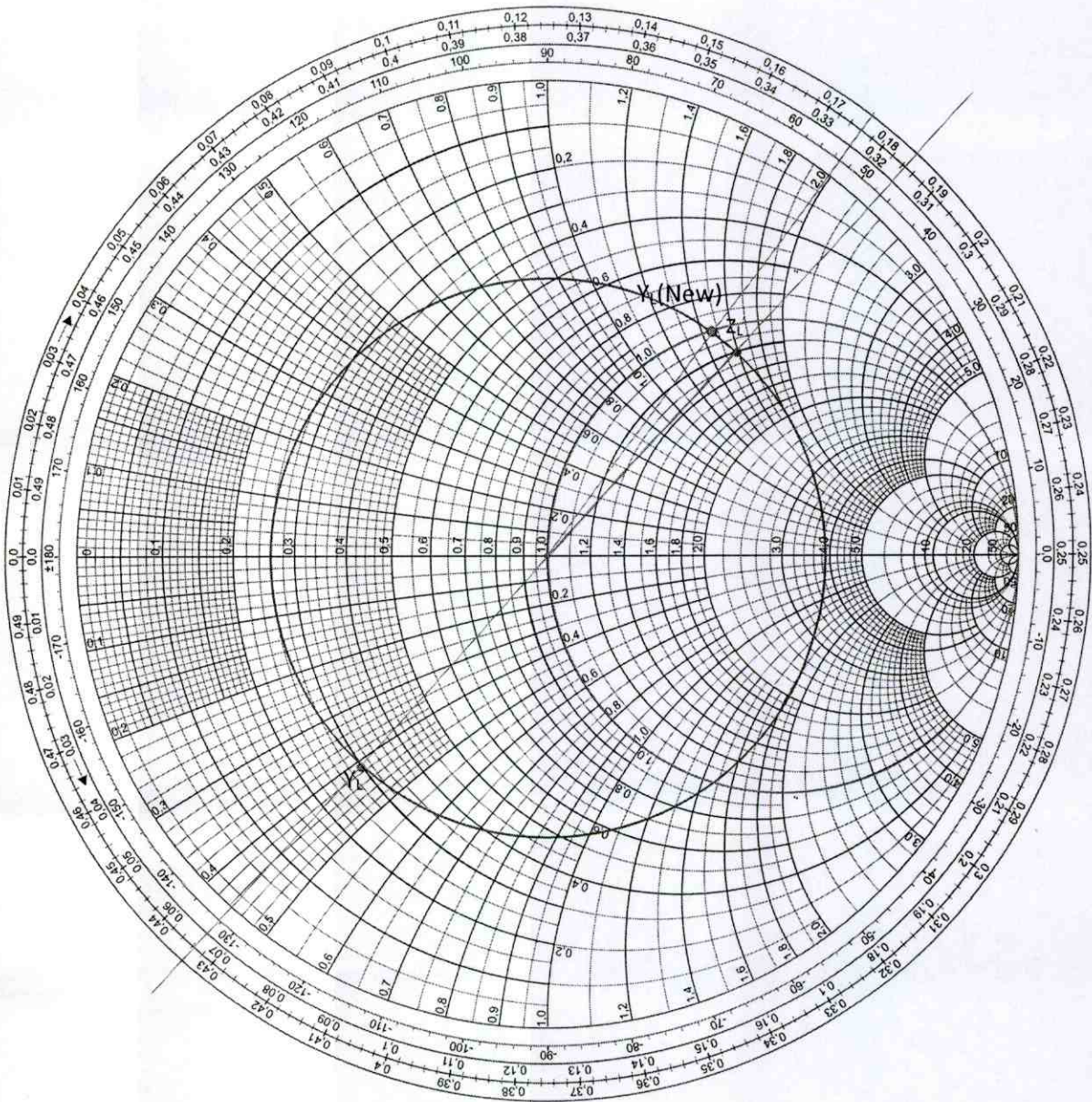
**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EC4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): II	Max Marks: 20
Submitted By: Dr. Shubhi Jain, Mr. Ankit Agarwal		

Answer:  $Z_L = 60 + j80$

$Z_0 = 50$

$Z_L' = 1.2 + j1.6$



VSWR = 3.9 (Approximate)

Voltage Minima occurs at  $R=0$  point. At this point  $L = 0.5\lambda$

the position of  $Z_L'$  is  $0.185\lambda$ . if  $Z_L$  is shift to  $0.5\lambda$  the first voltage minima occurs. for this  $Z_L$  is shift towards load at a distance of  $0.5\lambda - 0.185\lambda = 0.315\lambda$



**Solution of Question Paper**  
I Mid-Term Examination, Nov. -2022

Branch/Semester: V	Subject: Electromagnetics Waves	Subject Code: 5EE4-02
Duration: 1.5 hours	Date: 10/11/2022 Session (I/II/III): II	Max Marks: 20
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for distance of first stub rotate  $Y_L$  in clockwise direction to cut the unit circle  $1+jx$ . with respect to this point calculate the wavelength of that point and the wavelength difference between the  $Y_L$  and  $Y_L(\text{new})$  after shift the  $Y_L$  at  $1+jX$  circle.

Wavelength of  $Y_L=0.434\lambda$

Wavelength of  $Y_L(\text{New})= 0.146\lambda$

Distance of first stub is  $(0.5-0.434+0.176)\lambda = 0.242\lambda$



Swami Keshvanand Institute of Technology, Management &  
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**Analysis of Question Paper**  
I Mid-Term Examination, Sept.- 2022

Branch/Semester:	Subject: EW	Subject Code: 5EC4-02
Duration: 1.5 hours	Session (I/II/III): I	Max Marks:20
Submitted By:	Dr. Shubhi Jain, Ankit Agarwal	

**A. Distribution of Course Outcome and Bloom's Taxonomy in Question Paper**

Q. No	Questions	Marks	CO	BL
1	A telephone line has $R=40\Omega/\text{km}$ , $L=80\text{mH}/\text{km}$ , $G=0$ and $C= 15 \mu\text{F}/\text{km}$ . At $f=2 \text{ kHz}$ obtains (a) The characteristic impedance of the line (b) The propagation constant	2	2	3
2	Write Maxwell's equation in differential and integral form.	2	1	1
3	Explain the physical significance (cases) of relative permittivity in a conducting ( $\epsilon_{rc}$ ) medium for dielectric and conducting behaviour.	2	5	2
4	Derive the voltage and current equations for transmission line. Also deduce the characteristics impedance for loss less and lossy medium	4	2	2
5	Derive the boundary conditions for electric field using Maxwell equations at the interface of two dielectric mediums.	4	1	2
6	A uniform plane wave traveling in a medium having dielectric constant 9, has peak electric field of 20 V/m. The frequency of the wave is 1 GHz. Find the wavelength and peak magnetic field of the wave. If at some location ( $z=0$ ) and some instant ( $t=0$ ), the electric field is 8V/m, find the magnitudes of the electric field and magnetic field at $z=3\text{m}$ and $t= 80 \text{ msec}$ . Assume that wave is moving in z-direction.	4	5	3
7	State Poynting Theorem. Derive the expression for net outward power through the surface.	6	4	2
8	A lossless transmission line with characteristics impedance 50 ohm is 30 metres long and operates at 2 MHz. The line is terminated with a load of $60+j80$ ohms. Calculate (Using Smith Chart) (a) VSWR (b) Position of First voltage Minima (c) Distance of first stub for impedance matching.	6	3	3

**BL – Bloom's Taxonomy Level**

(1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 - Creating)

**CO – Course Outcome**

1. Understand the depth of static and time-varying electromagnetic field as governed by Maxwell's equations.
2. Describe the characteristics of guided waves between parallel plane and rectangular waveguide.
3. Apply Smith chart for solution of transmission line problems.
4. Apply concepts of EW propagation in Antenna Engineering and its applications
5. Analyze uniform plane wave propagation in different medium and reflection and refraction of plane wave at different media interface.



Swami Keshvanand Institute of Technology, Management &  
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**Analysis of Question Paper**  
I Mid-Term Examination, Sept.- 2022

Branch/Semester:	Subject: EW	Subject Code: 5EC4-02
Duration: 1.5 hours	Session (I/II/III): I	Max Marks:20
Submitted By:	Dr. Shubhi Jain, Ankit Agarwal	

**B. Questions and Course Outcomes (COs) Mapping in terms of correlation**

COs	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
CO1	-	3	-	-	3	-	-	-
CO2	3	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	3	-
CO5	-	-	3	-	-	3	-	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

**C. Mapping of Bloom's Level and Course Outcomes with Question Paper**

Bloom's Level Mapping		CO Mapping	
Bloom's Level	Percentage	CO	Percentage
BL1	6.67	CO1	20
BL2	53.3	CO2	20
BL3	40	CO3	20
BL4	-	CO4	20
BL5	-	CO5	20
BL6	-	CO6	-

Examination (Theory Mid Term - I)

Department: ECE

Candidate Name: Aksh Agarwal

Course Name with CODE: Electromagnetic Waves (SEC4-02)

Upon successful completion of this course, students will be able to:

CO1: Understand the depth of static and time-varying electromagnetic field as governed by Maxwell's equations.

CO2: Describe the characteristics of guided waves between parallel plane and rectangular waveguide

CO3: Apply the Smith chart for the solution of transmission line problems.

CO4: Apply concepts of EW propagation in Antenna Engineering and its applications.

CO5: Analyze uniform plane wave propagation in different medium and reflection and refraction of plane wave at different media interface.

## 1 - MID TERM EVALUATION

## Section-A

S.N O.	ROLL NO	PART →	A			B			C		Total (20)	Assignment (10)	Total (30)
		Note →	Attempt All			Attempt Any Two			Attempt Any One				
		QUESTION NO. →	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8			
		COURSE OUTCOME(S) SATISFIED →	CO2	CO1	CO5	CO2	CO1	CO5	CO4	CO3			
		MAXIMUM MARKS →	2	2	2	4	4	4	6	6			
		MINIMUM QUALIFYING MARKS (50%) →	1	1	1	2	2	2	3	3			
NAME OF STUDENT ↓													
1	20ESKEC001	Aabhas Nama	2	2	1.5	4	2.5	NA	NA	1.5	14	9	23
2	20ESKEC003	Abhay Bhardwaj	2	1.5	0.5	4	2.5	NA	NA	1	12	9	21
3	20ESKEC004	Abhay Mangal	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	8
4	20ESKEC005	Abhinav Mathur	1.5	2	0.5	4	3.5	NA	NA	0	12	8	20
5	20ESKEC006	Abhishek Sharma	1.5	2	0.5	4	0	NA	NA	2.5	11	10	21
6	20ESKEC007	Abhishek Singh	1.5	2	1	4	NA	3	NA	0	12	10	22
7	20ESKEC009	Adarsh Sain	1.5	2	1	3	4	NA	NA	1	13	9	22
8	20ESKEC010	Aditya Kumar Mecna	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	0
9	20ESKEC011	Aditya Narayan	0.5	2	0.5	3.5	3	NA	NA	5	15	10	25
10	20ESKEC012	Ajay Kumar Sharma	1	0	1	1.5	NA	1	NA	2	7	10	17
11	20ESKEC014	Akash Kumar	1.5	2	1.5	4	4	NA	NA	5.5	19	10	29
12	20ESKEC015	Amartia Anand	1.5	2	0	1.5	0	NA	NA	3.5	9	9	18
13	20ESKEC016	Amol Kumari	1	2	0	4	0.5	NA	NA	2	10	9	19
14	20ESKEC019	Ankush Gupta	0.5	0.5	0	1.5	NA	1.5	3	NA	7	9	16
15	20ESKEC020	Anshuman Singh Rathore	1	2	0.5	4	NA	0	NA	3	11	8	19
16	20ESKEC021	Anushka Jain	1	1	0.5	2.5	NA	1	NA	2.5	9	10	19
17	20ESKEC022	Archita Gocher	1.5	2	0	4	0	NA	NA	2	10	9	19
18	20ESKEC023	Arun Singh	0.5	0	0.5	0.5	0.5	NA	NA	0.5	3	10	13
19	20ESKEC025	Ashish Gurjar	1	1	0.5	2.5	0.5	NA	NA	3	9	8	17
20	20ESKEC026	Ashutosh Jangir	1.5	0	0.5	1	0.5	NA	NA	0.5	4	9	13
21	20ESKEC027	Astha Jain	1	2	0	2	2	NA	NA	0	7	10	17
22	20ESKEC028	Avni Jain	1.5	1	1	2.5	0.5	NA	NA	1	8	9	17
23	20ESKEC029	Ayush Pandey	1.5	2	2	4	4	NA	NA	2	16	10	26
24	20ESKEC030	Bhoomika Bulchandani	1.5	2	0.5	4	4	NA	NA	4.5	17	10	27
25	20ESKEC031	Chakshit Gunidia	1.5	2	0	3.5	4	NA	NA	4.5	16	10	26
26	20ESKEC032	Charvi Dadhich	1	2	0.5	2.5	4	NA	NA	3.5	14	10	24
27	20ESKEC033	Chirayu Jain	1	1.5	0	1.5	4	NA	NA	0.5	9	10	19
28	20ESKEC034	Chitaansh	0.5	0.5	0	1.5	0	NA	NA	0.5	3	8	11
29	20ESKEC035	Chitvan Tak	1	1	0	4	0	NA	NA	2	8	9	17

20ESKEC036	Dhiraj Kumar	1	0	0.5	2	0	NA	NA	1	5	10	15
32 20ESKEC037	Dhruv Jain	1.5	2	0	1	4	NA	NA	1	10	9	19
33 20ESKEC038	Dhruvtash Gupta	1	0.5	0.5	1	0	NA	NA	0	3	9	12
34 20ESKEC039	Dikshant Sharma	1.5	2	1	4	4	NA	NA	4.5	17	10	27
35 20ESKEC040	Divyansh Gupta	1.5	2	1	3.5	4	NA	NA	1.5	14	10	24
36 20ESKEC041	Divyansh Sharma	1.5	1.5	1	1	1.5	NA	NA	2	9	9	18
37 20ESKEC042	Gaurav Kumar Gupta	1.5	1.5	0	0	2	NA	NA	0	5	9	14
38 20ESKEC043	Gaurav Kumar Saini	1	1	0.5	3	4	NA	NA	0	10	9	19
39 20ESKEC044	Gautam Kumar Kamat	1.5	0	0	2	0	NA	NA	0	4	9	13
40 20ESKEC045	Hammir Chaturvedi	1	0	0.5	2.5	0	NA	NA	3.5	8	8	16
41 20ESKEC046	Hariom Kumar	0.5	0.5	0	1.5	0	NA	NA	0	3	10	13
42 20ESKEC047	Harshit Parwani	0.5	2	0	0	0	NA	NA	0	3	8	11
43 20ESKEC048	Hemant Kumar Atal	1.5	2	0	3.5	0	NA	NA	3	10	9	19
44 20ESKEC049	Hiren Vaishnav	1.5	2	1	3.5	0	NA	NA	4.5	13	8	21
45 20ESKEC050	Jagrati Meena	1.5	2	0	4	0.5	NA	NA	4.5	13	10	23
46 20ESKEC051	Jamuna Jangid	1.5	1.5	1.5	4	0	NA	NA	5	14	10	24
47 20ESKEC052	Jayesh Mour	1	1	1.5	0.5	0	NA	NA	0	4	8	12
48 20ESKEC053	Jayesh Vashishtha	1.5	0.5	0	3.5	4	NA	NA	0	10	9	19
49 20ESKEC054	Kamal Nayan	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS
20ESKEC055	Kanak Singhal	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS
20ESKEC056	Kartik Tiwari	DB	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS
51 20ESKEC057	Kashish Arora	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	9
52 20ESKEC058	Kashish Jagwani	1	0.5	0.5	2	1.5	NA	NA	0	6	10	16
53 20ESKEC059	Kashish Karamchandani	1	1	1	4	3	NA	NA	0.5	11	10	21
54 20ESKEC060	Kashish Sharma	1.5	2	0	4	4	NA	NA	6	18	9	27
55 20ESKEC062	Khushi Garg	1	2	0	4	3.5	NA	NA	5	16	10	26
56 20ESKEC063	Kirti Sagar	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	9
57 20ESKEC065	Kushal Tambi	1.5	2	0.5	3	4	NA	NA	0.5	12	9	21
<b>Total No. of DEBARRED (DB)</b>		5	5	5	5	5	5	5	5			
<b>Total No. of ABSENT (AB)</b>		2	2	2	2	2	2	2	2			
<b>Total Students Appeared for Exam</b>		50	50	50	50	50	50	50	50			
<b>Total Students Attempted the Question (A)</b>		50	50	50	50	45	5	1	49			
<b>No. of Students scored &gt;=50% marks (B)</b>		44	38	14	36	22	1	1	16			
<b>Percentage Attainment of Criterion (B/A)</b>		88.00	76.00	28.00	72.00	48.89	20.00	100.00	32.65			
<b>CO Attainment Level</b>		3	3	1	3	1	1	1	1			
<b>Attainment of CO-1</b>		58%	1									
<b>Attainment of CO-2</b>		77%	3									
<b>Attainment of CO-3</b>		33%	1									
<b>Attainment of CO-4</b>		100%	3									
<b>Attainment of CO-5</b>		23%	1									
<b>Criterion of Percentage for CO Attainment Level</b>		Attainment Level										
<b>Percentage attainment Below 60%</b>		1										
<b>Percentage attainment 60%-69.99%</b>		2										
<b>Percentage attainment Above and equal to 70%</b>		3										
<b>Mr. Ankit Agarwal</b>												
<b>Faculty name with signature</b>												

Ankit  
(Ankit Agarwal)



CO's Attainment (Theory Mid Term : I)

Department: ECE

Faculty Name: DR.SHUBHI JAIN

Course Name with CODE: EW(5EC4-02)

Upon successful completion of this course, students will be able to:

CO1: Understand the depth of static and time-varying electromagnetic field as governed by Maxwell's equations.

CO2: Describe the characteristics of guided waves between parallel plane and rectangular waveguide.

CO3: Apply Smith Chart for solution of transmission line problems.

CO4: Apply concepts of EW Propagation in Antenna Engineering and its applications.

CO5: Analyze uniform plane wave propagation in different medium and reflection and refraction of plane wave at different media Interface.

## MID TERM EVALUATION

## Section-B

S.NO.	ROLL NO	PART → Note→ QUESTION NO. → COURSE OUTCOME(S) SATISFIED → MAXIMUM MARKS → MINIMUM QUALIFYING MARKS (50%) → NAME OF STUDENT ↓	A			B			C		Total (20)	Assignment (10)	Total (30)
			Attempt All			Attempt Any Two			Attempt Any One				
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8			
			CO2	CO1	CO5	CO2	CO1	CO5	CO4	CO3			
			2	2	2	4	4	4	6	6			
			1	1	1	2	2	2	3	3			
1	20ESKEC066	Lakshit Jain	1	1	0	2	3	NA	NA	0	7	8	15
2	20ESKEC067	Lakshya Verma	1	1	NA	3	3	NA	NA	2	10	9	19
3	20ESKEC068	Lavina Lahoty	1	2	0	3	3	NA	NA	4	13	10	23
4	20ESKEC070	Manan Sharma	1	1	NA	3	2	NA	NA	3	10	8	18
5	20ESKEC071	Mayank Sharma	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	8
6	20ESKEC072	Megha Jangid	1	1	0	3	3	NA	NA	4	12	10	22
7	20ESKEC073	Mohit Kumar Singh	1	1	NA	0	NA	NA	NA	NA	2	NS	2
8	20ESKEC074	Mohit Yadav	1	1	1	4	3	NA	6	NA	16	10	26
9	20ESKEC075	Moksh Avasthi	1	1	1	2	1	NA	NA	0	6	8	14
10	20ESKEC076	Muskan Meena	1	1	1	3	2	NA	NA	4	12	8	20
11	20ESKEC077	Naman Agarwal	1	1	1	2	3	3	NA	NA	11	7	18
12	20ESKEC079	Navdeep Choudhary	1	0	0	3	3	NA	NA	5	12	8	20
13	20ESKEC080	Navneet Kumar	NA	1	0	1	0	NA	NA	NA	2	7	9
14	20ESKEC081	Niharika Chugh	1	1	0	3	3	NA	NA	3	11	9	20
15	20ESKEC083	Om Jaiswal	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB
16	20ESKEC084	Om Verma	1	0	NA	0	NA	NA	NA	0	1	8	9
17	20ESKEC085	Param Agarwal	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	8
18	20ESKEC086	Parshant Sharma	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB
19	20ESKEC087	Pawani Bhardwaj	1	1	0	3	NA	1	NA	5	11	10	21
20	20ESKEC088	Prachi Dhilwal	1	1	NA	4	3	NA	NA	1	10	9	19
21	20ESKEC089	Pradeep Bhat	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	8
22	20ESKEC090	Prajawal Nirvan	1	1	0	3	1	NA	NA	0	6	8	14
23	20ESKEC091	Prashansa Khandelwal	1	1	0	3	3	NA	NA	5	13	10	23
24	20ESKEC092	Pratyush Saraswat	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB
25	20ESKEC093	Prince Singhal	1	1	1	3	0	NA	NA	4	10	9	19
26	20ESKEC094	Priya Gupta	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	9
27	20ESKEC095	Pulkit Sharma	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB	9
28	20ESKEC096	Purvi Tanwar	DB	DB	DB	DB	DB	DB	DB	DB	DB	10	10
29	20ESKEC097	Radhika Ojha	DB	DB	DB	DB	DB	DB	DB	DB	DB	7	7

30	20ESKEC099	Raghav Gupta	1	1	NA	0	NA	0	NA	1	3	9	12
31	20ESKEC100	Ritu Yadav	1	1	0	4	3	NA	NA	5	14	9	23
32	20ESKEC101	Rohit Jarwal	1	NA	NA	1	NA	NA	NA	NA	2	8	10
33	20ESKEC102	Sahil Yadav	0	0	NA	1	NA	0	NA	NA	1	8	9
34	20ESKEC103	Sakshi Singh	1	0	1	4	2	NA	3	NA	1	9	20
35	20ESKEC104	Sambhav Jain	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB
36	20ESKEC105	Samridhi	AB	AB	AB	AB	AB	AB	AB	AB	AB	7	7
37	20ESKEC106	Samyak Jain	1	1	0	3	2	NA	4	NA	11	8	19
38	20ESKEC107	Sanchit Agrawal	1	1	1	2	0	NA	NA	4	9	9	18
39	20ESKEC109	Shikha Kumari	1	0	1	1	NA	0	NA	4	7	7	14
40	20ESKEC110	Shivani Lamba	1	1	NA	3	3	NA	NA	5	13	9	22
41	20ESKEC111	Siddharth Choabey	1	1	1	2	2	NA	NA	5	12	8	20
42	20ESKEC112	Sooraj Pachouri	1	1	0	3	3	NA	NA	5	13	8	21
43	20ESKEC113	Sunil Kumawat	0	2	0	1	4	NA	NA	5	12	9	21
44	20ESKEC114	Suraj Singh Shekhawat	1	0	0	3	3	NA	NA	1	8	7	15
45	20ESKEC115	Swati Aggarwal	1	1	1	3	3	NA	NA	0	9	8	17
46	20ESKEC116	Tanish Khandal	1	1	0	3	3	NA	NA	4	12	8	20
47	20ESKEC117	Tushar Vijayvargia	1	2	0	2	3	NA	NA	3	11	9	20
48	20ESKEC118	Umang Sharma	2	2	0	2	3	NA	NA	6	15	10	25
49	20ESKEC119	Utkarsh Bhargava	1	0	NA	1	NA	NA	NA	3	5	8	13
50	20ESKEC120	Utkarsh Gautam	1	1	0	3	2	NA	NA	NA	8	7	15
51	20ESKEC121	Utkarsh Khandelwal	1	1	0	3	3	NA	NA	5	13	9	22
52	20ESKEC122	Vaibhav Kunal	DB	DB	DB	DB	DB	DB	DB	DB	DB	8	8
53	20ESKEC123	Vipasha Goyal	1	0	0	3	3	NA	NA	5	12	9	21
54	20ESKEC124	Vishal Moud	1	1	0	3	3	NA	NA	3	11	9	20
55	20ESKEC125	Yash Bairwa	1	0	NA	NA	0	NA	NA	NA	1	8	9
56	20ESKEC127	Yatin Parmar	1	1	0	3	3	NA	NA	5	13	8	21
57	20ESKEC300	Somik Choudhary	0	1	0	3	0	NA	NA	1	5	7	12
58	20ESKEC301	Kushmay Porwal	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB
59	20ESKEC302	Chandan Kumar	NA	NA	NA	2	3	NA	NA	NA	5	NS	5
60	20ESKEC303	Hemant Ameta	0	NA	0	NA	0	0	NA	NA	0	8	8
61	20ESKEC304	Kartik Somani	0	0	0	NA	NA	NA	NA	NA	1	8	9
62	20ESKEC305	Manav Rathore	1	1	0	0	0	NA	NA	0	2	8	10
63	20ESKEC306	Sourav Majee	1	0	0	1	NA	0	NA	2	4	8	12
64	21ESKEC200	Amisha Jha	1	1	0	4	3	NA	NA	5	14	9	23
Total No. of DEBARRED (DB)			11	11	11	11	11	11	11	11			
Total No. of ABSENT (AB)			3	3	3	3	3	3	3	3			
Total Students Appeared for Exam			50	50	50	50	50	50	50	50			
Total Students Attempted the Question (A)			48	47	38	47	40	7	5	37			
No. of Students scored $\geq 50\%$ marks (B)			43	36	10	36	31	1	3	25			
Percentage Attainment of Criterion (B/A)			89.58	76.60	26.32	76.60	77.50	14.29	60.00	67.57			
CO Attainment Level			3	3	1	3	3	1	2				
Attainment of CO-1			77%	3									
Attainment of CO-2			83%	3									
Attainment of CO-3			68%	2									
Attainment of CO-4			60%	1									
Attainment of CO-5			24%	1									
Criterion of Percentage for CO Attainment Level			Attainment Level										
Percentage attainment Below 60%			1										
Percentage attainment 60%-69.99%			2										
Percentage attainment Above and equal to 70%			3										

*Amisha Jha*  
19/11/21



**Swami Keshvanand Institute of Technology,  
Management & Gramothan, Jaipur  
II Mid Term Examination, May-2023**

Semester:	VI	Branch:	ECE
Subject:	Information Theory and Coding	Subject Code:	6EC4-05
Time:	1.5 Hours	Maximum Marks:	20
Session (I/II/III): I			

**PART A (short-answer type questions)**

(All questions are compulsory)

(3\*2=6)

- Q.1 Write the difference between blocks code and convolutional code.  
Q.2 Explain the role of minimum distance in error correction and detection.  
Q.3 Define the following terms

(a) Code rate    (b) Code word

**PART B (Analytical/Problem solving questions)**

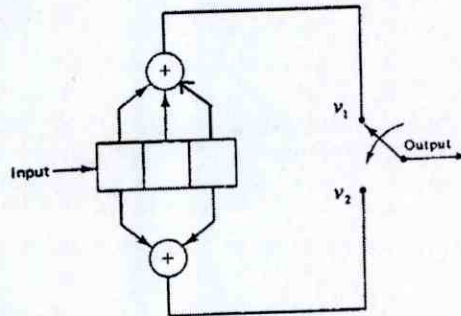
(Attempt any 2 Questions)

( 2\*4=8)

- Q.4 Draw and design the (7, 4) Encoder for cyclic code with  $G(p)=1+p+p^3$  and  $d=1100$ . Also find the code word.
- Q.5 The generator polynomial for a (7, 4) cyclic code is given by  $G(P) = 1+p+p^3$ . Determine systematic code vector for message vector 1010.
- Q.6 A parity check code has the parity check matrix
- $$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$
- (a) Determine the generator matrix G.  
(b) Find the code word that begins 101.  
(c) Suppose that the received word is 110110. Decode this received word.

**PART C (Descriptive/Analytical/Problem solving/Design questions)**  
**(Attempt any 1 Question) (1\*6=6)**

**Q.7 Consider the convolutional encoder shown in fig.**



**(a) Find the impulse response of the encoder.**

**(b) Find the output code word if the input sequence is 101.**

**Q.8 The parity check matrix of a (7,4) Hamming code is as under:**

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

**Calculate the syndrome vector for single bit errors.**



Solution of Question Paper  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI...	Subject: ...ITC.....	Subject Code: ... <u>EC4-05</u> ...
Duration: 1.5 hours	Date: <u>26.5.23</u> Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idwal, Abhinandan Jain		

Ans

Part A

Ques 1. Differentiate between

Ans 1 :-

Block codes

1. Information bits followed by parity bits
2. Block codes are memoryless
3. Block codes take  $k$  input bits and produce  $n$  output bit. when  $k$  and  $n$  are large

block codes & convolutional code.  
convolutional codes

1. Information bits are spread along the sequence
2. convolutional code have memory.
3. Convolutional codes take a small number of input bits and produce a small number of output bits each time period.



Solution of Question Paper  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI...	Subject: ...ITC.....	Subject Code: ...67C405
Duration: 1.5 hours	Date: ...26.5.23 Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idawal, Abhinandan Jain		

Ques 2 Explain the role of  $d_{min}$  minimum distance in error correction and detection

Ans 2 :- The error detection and correction capabilities of a coding technique depend on the minimum distance  $d_{min}$

1. Detect upto  $s$  error per word  $d_{min} \geq (s+1)$
2. Correct upto  $t$  errors per word  $d_{min} \geq (2t+1)$
3. Correct upto  $t$  errors and detect  $s > t$  error per word  $d_{min} \geq (t+s+1)$

Ques 3 :- Define the following terms

Ans (a) Code rate :- The code rate is defined as the ratio of the number of message bits ( $k$ ) to the total number of ( $n$ ) in a code word.

(b) code word :- The code word is the  $n$ -bit encoded block of bits. it contains message bits and parity bits (i.e. redundant bits)



**Solution of Question Paper**

II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: ...6EC4-05
Duration: 1.5 hours	Date: 26.5.23	Session (I/II/III): .....
Submitted By: Rajni Idawal, Abhinandan Jain		Max Marks: ...20...

Part B

Q.4 :- Draw and design the (7,4) Encoder for cyclic codes with  $g(p) = 1 + p + p^3$  and  $d = 1100$ . Also find the code word.

Solu

$$g(p) = p^3 + p + 1$$

$$\text{or } g(p) = p^3 + 0p^2 + p + 1 \quad \text{--- (1)}$$

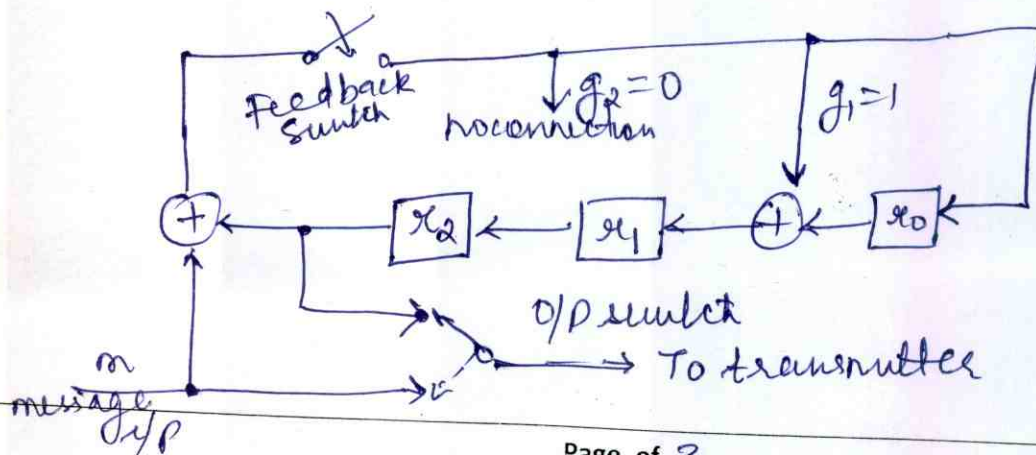
Generalized Equation

$$g(p) = p^3 + g_2 p^2 + g_1 p + 1 \quad \text{--- (2)}$$

comparing equation (1) & (2), we get

$$g_1 = 1 \quad \& \quad g_2 = 0$$

$$n - k = 3$$





**Solution of Question Paper**  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: .....
Duration: 1.5 hours	Date:.....	Session (I/II/III): .....
Submitted By: Rajni Idwal, Abhinandan Jain		Max Marks: ...20...

Input message $m$	Register bits before shift	Register bits after shift
	$r_2=r_2', r_1=r_1', r_0=r_0'$	$r_2'=r_1, r_1'=r_0+r_2+m, r_0'=r_2 \oplus m$
1	0 0 0	0 0 0
1	0 0 0	0 1 1
1	0 1 1	1 0 1
0	1 0 1	0 0 1
0	0 0 1	0 1 0

The check bits are  $c_2 c_1 c_0 = 010$

$$X = (m_3 m_2 m_1 m_0 c_2 c_1 c_0)$$

$$X = 1100010$$





Solution of Question Paper  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI...	Subject: ...ITC.....	Subject Code: <u>6.ECE4-05</u>
Duration: 1.5 hours	Date: <u>26.5.23</u> Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idawal, Abhinandan Jain		

Ques 5:- The Generator polynomial for a (7, 4) cyclic Hamming is given by  
$$g(p) = 1 + p + p^3$$

Determine systematic code vectors for message vector 1010

Soln:-  $n = 7$   $k = 4$   $n - k = 3$

There will be  $2^4 = 16$  Message words.

Given to us a  $M = (m_0, m_1, m_2, m_3) = 1010$

message polynomial  $M(p) = 1 + p^2$

generator polynomial  $M(p) = 1 + p + p^3$

For systematic form

Multiply  $M(p)$  by  $p^{n-k}$

$$p^{n-k} M(p) = p^3 (1 + p^2)$$

$$p^{n-k} M(p) = p^3 + p^5$$

divide  $p^{n-k} M(p)$  by  $g(p)$



Solution of Question Paper

II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: ...GEC403
Duration: 1.5 hours	Date: 26.5.23 Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idawal, Abhinandan Jain		

$$\frac{p^{n-k}M(p)}{C(p)} = \frac{p^3 + p^5}{1 + p + p^3}$$

$$\begin{array}{r}
 p^2 \leftarrow \text{Divident polynomial } Q(p) \\
 p^3 + 0p^2 + p + 1 \sqrt{p^5 + 0p^4 + p^3 + 0p^2 + 0p + 0} \\
 \underline{p^5 + 0p^4 + p^3 + p^2} \\
 p^2 + 0p + 0
 \end{array}$$

↑ Remainder polynomial  $C(p)$

Remainder polynomial  $C(p) = 0 + 0p + p^2$

↑ Represent parity bits

∴ Code word polynomial

$$X(p) = p^{n-k}M(p) \oplus C(p)$$

$$\therefore = [0 + 0p + 0p^2 + p^3 + 0p^4 + p^5 + 0p^6]$$

$$\oplus [0 + 0p + 0p^2]$$

$$\text{or } X(p) = [0 + 0p + p^2 + p^3 + 0p^4 + p^5 + 0p^6]$$

$$\boxed{\text{code word vector } x = [001 \mid 1010]}$$

Parity bits

Message bits



**Solution of Question Paper**  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: ...ECU-05
Duration: 1.5 hours	Date: 26.5.23	Session (I/II/III): .....
Submitted By: Rajni Idawal, Abhinandan Jain		Max Marks: ...20...

Ques 5 :- A parity check matrix code has the parity check matrix

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

- (a) Determine the Generator matrix
- (b) Find the code word that begins with 101
- (c) Suppose that received word is 110110. Decode the received word.

Soln :- Here  $n=6$   $k=3$   $n-k=3$

(a) We know

$$[H] = [P^T : I_{n-k}]_{n-k \times n}$$

$$[H]_{3 \times 6} = [P^T : I_3]_{3 \times 6}$$

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$



**Solution of Question Paper**  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI...	Subject: ...ITC.....	Subject Code: ... <u>ECE405</u> ...
Duration: 1.5 hours	Date: ... <u>26.5.23</u> ... Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idwal, Abhinandan Jain		

$$\text{or } P^T = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}_{3 \times 3}$$

$$P = (P^T)^T = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

Generator matrix

$$G = [I_k; P_{k \times (n-k)}]_{k \times n}$$

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}_{3 \times 6}$$

(ii) Message vector

$$M = [1 \ 0 \ 1]$$

$$[c_0 \ c_1 \ c_2] = [m_0 \ m_1 \ m_2] [P]$$

$$= [m_0 \ m_1 \ m_2] \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

$$c_0 = (m_0 \times 1) \oplus (m_1 \times 0) \oplus (m_2 \times 1) = m_0 \oplus m_2$$

$$c_0 = 1 \oplus 1 = 0$$



**Solution of Question Paper**  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: <u>ECU-05</u>
Duration: 1.5 hours	Date: <u>26.5.23</u> Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idwal, Abhinandan Jain		

Similarly  $C_1 = (m_0 \times 1) \oplus (m_1 \times 1) \oplus (m_2 \times 0) = m_0 \oplus m_1$   
substituting  $m_0 = 1$  &  $m_1 = 0$

$$C_1 = 1 \oplus 0 = 1$$

and  $C_2 = (m_0 \times 0) \oplus (m_1 \times 1) \oplus (m_2 \times 1)$   
 $= m_1 \oplus m_2$

$$C_2 = 0 \oplus 1 = 1$$

$\therefore$  parity word  $C = [0 \ 1 \ 1]$

(iii) Received code word,  $Y = 110 \ 110$   
syndrome  $S = YH^T$

$$S = [110 \ 110] \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$S = [0 \ 1 \ 1]$$

This is the same as second row  
of the transpose matrix  $H^T$ ,  
which indicates that there is no error  
in the second bit of the received signal



Solution of Question Paper

II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: ...6.EC4-05
Duration: 1.5 hours	Date: 26.5.23 Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idawal, Abhinandan Jain		

$y = 110110$  <sup>↙ Error</sup>

correct word  $x = 100110$  Ans.



Solution of Question Paper  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: ...EC4-05
Duration: 1.5 hours	Date: 26-5-23 Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idawal, Abhinandan Jain		

⑦ The equation for the outputs

$$V_1 = x_0 \oplus x_1 \oplus x_2$$

$$V_2 = x_0 \oplus x_2$$

a) The impulse response of the circuit:

Input	$x_0$	$x_1$	$x_2$	$V_1$	$V_2$
	0	0	0		
1 →	1	0	0	1	1
0 →	0	1	0	1	0
0 →	0	0	1	1	1
	0	0	0		

The impulse response is

$$(11 \ 10 \ 11)$$

b. The output code word if the input sequence is 101.

Input

1	11	10	11		
0		00	00	00	
1			11	10	11
	11	10	00	10	11



Solution of Question Paper

II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI...	Subject: ...ITC.....	Subject Code: <u>EC4-05</u>
Duration: 1.5 hours	Date: <u>26.5.23</u> Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idawal, Abhinandan Jain		

The output code word is: 1110001011.

Sol. 8 :

The parity check matrix is:

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

The syndrome vector is given by:

$$S = EHT$$

Let us consider single bit error in first place:

$$E = 1000000$$

$$S = [1000000] \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$$

$$S = [1 \ 1 \ 1]$$

if  $E = 0100000$

$$S = [0100000] \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} = [1 \ 1 \ 0]$$





Solution of Question Paper  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: GECU-05
Duration: 1.5 hours	Date: 26.05.23	Session (I/II/III): .....
Submitted By: Rajni Idwal, Abhinandan Jain		Max Marks: ...20...

if  $E = 0010000$

$$S = [0010000] \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} = [101]$$

if  $E = 0001000$

$$S = [0001000] \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} = [011]$$

if  $E = 0000100$

$$S = [0000100] \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} = [100]$$

if  $E = 0000010$

$$S = [0000010] \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} = [010]$$



**Solution of Question Paper**  
II Mid-Term Examination, May. -2023

Branch/Semester: ...ECE/VI....	Subject: ...ITC.....	Subject Code: ...ECE4-05
Duration: 1.5 hours	Date: 26.05.23 Session (I/II/III): .....	Max Marks: ...20...
Submitted By: Rajni Idawal, Abhinandan Jain		

if  $E = 0000001$

$$S = [00000001] \begin{bmatrix} 1111 \\ 110 \\ 101 \\ 011 \\ 100 \\ 010 \\ 011 \end{bmatrix} = [011]$$

Syndromes for various error vectors:

Error vectors with single bit errors:

0	0	0	0	0	0	0
1	0	0	0	0	0	0
0	1	0	0	0	0	0
0	0	1	0	0	0	0
0	0	0	1	0	0	0
0	0	0	0	1	0	0
0	0	0	0	0	1	0
0	0	0	0	0	0	1

Syndrome vectors

0	0	0
1	1	1
1	1	0
1	0	1
0	1	1
1	0	0
0	1	0
0	1	1

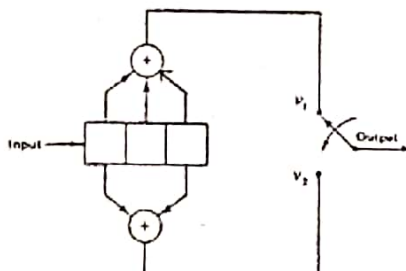


**Swami Keshvanand Institute of Technology, Management &  
Gramothan, Ramnagar, Jagatpura, Jaipur-302017**

**Analysis of Question Paper**  
**II Mid-Term Examination, May- 2023**

Branch/Semester:ECE/VI	Subject: Information Theory and Coding	Subject Code: 6EC4-05
Duration: 1.5 hours	Session (I/II/III): I	Max Marks:20
Submitted By:	Abhinandan Jain/Rajini Idiwai	

**A. Distribution of Course Outcome and Bloom's Taxonomy in Question Paper**

Q. No	Questions	Marks	CO	BL
1	Write the difference between block code and convolutional code.	2	4	2
2	Explain the role of minimum distance in error correction and detection.	2	4	2
3	Define the following terms (a) Code rate (b) Code word	2	4	1
4	Draw and design the (7, 4) Encoder for cyclic code with $G(p)=1+p+p^3$ and $d=1100$ . Also find the code word.	4	4	3
5	The generator polynomial for a (7, 4) cyclic code is given by $G(P) = 1+p+p^3$ . Determine systematic code vector for message vector 1010.	4	4	3
6	A parity check code has the parity check matrix $H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$ (a) Determine the generator matrix G. (b) Find the code word that begins 101. (c) Suppose that the received word is 110110. Decode this received word.	4	5	3
7	Consider the convolutional encoder shown in fig.  (a) Find the impulse response of the encoder. (b) Find the output code word if the input sequence is 101.	6	4	3
8	The parity check matrix of a (7,4) Hamming code is as under: $H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$ Calculate the syndrome vector for single bit errors.	6	5	3

**BL – Bloom's Taxonomy Level**

(1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 - Creating)

**CO – Course Outcome**

**B. Questions and Course Outcomes (COs) Mapping in terms of correlation**



Swami Keshvanand Institute of Technology, Management &  
Gramothan, Ramnagar, Jagatpura, Jaipur-302017

Analysis of Question Paper  
II Mid-Term Examination, May- 2023

Branch/Semester:ECE/VI	Subject: Information Theory and Coding	Subject Code: 6EC4-05
Duration: 1.5 hours	Session (I/II/III): I	Max Marks:20
Submitted By:	Abhinandan Jain/Rajini Idwal	

COs	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
CO1								
CO2								
CO3								
CO4	3	3	3	3	3		3	
CO5						3		3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

C. Mapping of Bloom's Level and Course Outcomes with Question Paper

Bloom's Level Mapping		CO Mapping	
Bloom's Level	Percentage	CO	Percentage
BL1	6.67	CO1	
BL2	13.33	CO2	
BL3	80	CO3	
BL4		CO4	66.67
BL5		CO5	33.33
BL6		CO6	

**Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur**  
**B.Tech III Year VI Semester (Session 2022-2023)**

CO's Attainment (Theory Mid Term : II) Department: ECE  
 Faculty Name: Abhinandan Jain Course Name with CODE: Information Theory and Coding 6EC4-05

Upon successful completion of this course, students will be able to:  
 CO1: Define the amount of information per symbol and information rate of a discrete memory less source.  
 CO2: Explain Shannon-Hartley theorem for information transmission on Gaussian channels.  
 CO3: Apply lossless source codes for discrete memoryless source to improve the efficiency of information.  
 CO4: Apply different channel coding techniques for error detection and correction schemes.  
 CO5: Calculate the syndrome for received word to find error during transmission.

**MID TERM EVALUATION**

S.NO.	ROLL NO	PART → Note→	MID TERM EVALUATION								Section-A			
			A			B			C		Total (20)	Assignment (10)	Total (30)	
			Attempt All			Attempt Any Two			Attempt Any One					
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8				
			COURSE OUTCOME(S) SATISFIED →	CO4	CO4	CO4	CO4	CO4	CO5	CO4				CO5
			MAXIMUM MARKS →	2	2	2	4	4	4	6				6
MINIMUM QUALIFYING MARKS (50%) →	1	1	1	2	2	2	3	3						
NAME OF STUDENT ↓														
1	20ESKEC001	Aabbas Nama	2	1.5	1.5	2	-	3.5	4	-	14.5	10	25	
2	20ESKEC003	Abhay Bhardwaj	1	0	1	1.5	-	3.5	3	-	10	9	19	
3	20ESKEC004	Abhay Mangal	1.5	0	0.5	2	-	3.5	3	-	10.5	9	20	
4	20ESKEC005	Abhinav Mathur	2	2	2	0.5	-	3.5	5	-	15	9	24	
5	20ESKEC006	Abhishek Sharma	2	2	2	-	2	3.5	6	-	17.5	9	27	
6	20ESKEC007	Abhishek Singh	2	2	2	1	1	-	6	-	14	9	23	
7	20ESKEC009	Adarsh Sain	2	1.5	1.5	3	-	3	4	-	15	9	24	
8	20ESKEC010	Aditya Kumar Meena	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB+NS	
9	20ESKEC011	Aditya Narayan	1.5	2	1.5	1	-	3.5	6	-	15.5	9	25	
10	20ESKEC012	Ajay Kumar Sharma	2	1.5	2	3	1.5	-	5.5	-	15.5	9	25	
11	20ESKEC014	Akash Kumar	1.5	1.5	1.5	3.5	4	-	6	-	18	10	28	
12	20ESKEC015	Amartia Anand	1.5	1	1	0	-	2.5	5	-	11	8	19	
13	20ESKEC016	Amol Kumari	1.5	1.5	1.5	-	0	3	0	-	7.5	9	17	
14	20ESKEC019	Ankush Gupta	1	1	2	-	2.5	1.5	4.5	-	12.5	9	22	
15	20ESKEC020	Anshuman Singh Rathore	1.5	1.5	2	0	-	0	0	-	5	9	14	
16	20ESKEC021	Anushka Jain	2	1.5	2	1.5	-	3	-	2.5	12.5	10	23	
17	20ESKEC022	Archita Gocher	2	2	2	1.5	-	2	-	2	11.5	9	21	
18	20ESKEC023	Arun Singh	1.5	2	2	1.5	-	2	-	1.5	10.5	9	20	
19	20ESKEC025	Ashish Gurjar	1.5	2	1.5	-	1	3.5	6	-	15.5	9	25	
20	20ESKEC026	Ashutosh Jangir	2	1.5	2	2	1	-	6	-	14.5	9	24	
21	20ESKEC027	Astha Jain	2	1.5	0	0	-	0	-	0	3.5	9	13	
22	20ESKEC028	Avni Jain	2	1.5	1.5	-	2	2	6	-	15	9	24	
23	20ESKEC029	Ayush Pandey	2	1.5	2	2	-	4	6	-	17.5	9	27	
24	20ESKEC030	Bhoomika Bulchandani	2	2	2	-	3	4	6	-	19	10	29	
25	20ESKEC031	Chakshit Gunidia	2	1	1.5	2	-	4	6	-	16.5	10	27	
26	20ESKEC032	Charvi Dadhich	2	2	1.5	1.5	-	2.5	3	-	12.5	9	22	
27	20ESKEC033	Chirayu Jain	1	1.5	1.5	-	1.5	2	5	-	12.5	9	22	
28	20ESKEC034	Chitansh	1.5	1.5	2	-	0	2.5	0	-	7.5	9	17	
29	20ESKEC035	Chitvan Tak	2	1.5	2	2.5	3	-	6	-	17	9	26	
30	20ESKEC036	Dhiraj Kumar	1.5	1	1.5	2	-	3.5	6	-	15.5	9	25	
31	20ESKEC037	Dhiruv Jain	2	1.5	1	2	-	3.5	5	-	15	9	24	

32	20ESKEC038	Dhruvash Gupta	2	2	1.5	-	2	1	-	0	8.5	9	18
33	20ESKEC039	Dikshant Sharma	2	2	2	-	3	3	3.5	-	15.5	8	24
34	20ESKEC040	Divyansh Gupta	0	1	2	-	0	3.5	6	-	12.5	9	22
35	20ESKEC041	Divyansh Sharma	2	1.5	1.5	2.5	-	3.5	5	-	16	9	25
36	20ESKEC042	Gaurav Kumar Gupta	1	1.5	1.5	0	-	1.5	0	-	5.5	9	15
37	20ESKEC043	Gaurav Kumar Saini	UM	UM	UM	UM	UM	UM	UM	UM	0	UM	UM
38	20ESKEC044	Gautam Kumar Kamat	UM	UM	UM	UM	UM	UM	UM	UM	0	UM	UM
39	20ESKEC045	Hammir Chaturvedi	2	1.5	1.5	0	0	-	0	-	5	9	14
40	20ESKEC046	Harion Kumar	0	1	1	2	0	-	2	-	6	9	15
41	20ESKEC047	Harshit Parwani	1.5	1	0	-	3	3	5	-	13.5	9	23
42	20ESKEC048	Hemant Kumar Atal	1	1	0	2	-	3.5	5	-	12.5	9	22
43	20ESKEC049	Hiren Vaishnav	1.5	1.5	2	2.5	-	3	-	1	11.5	9	21
44	20ESKEC050	Jagrati Meena	2	2	2	2	-	3.5	5	-	16.5	10	27
45	20ESKEC051	Jamuna Jangid	2	1	1	-	2	3.5	-	6	15.5	9	25
46	20ESKEC052	Jayesh Mour	1	0	0	2	2	-	0	-	5	9	14
47	20ESKEC053	Jayesh Vashishtha	2	1.5	2	-	2	3	4.5	-	15	9	24
48	20ESKEC054	Kamal Nayan	0	0	0	-	0	0	0	-	0	9	9
49	20ESKEC055	Kanak Singhal	AB	AB	AB	AB	AB	AB	AB	AB	0	9	AB+9
50	20ESKEC056	Kartik Tiwari	0	2	2	-	0	2	3.5	-	9.5	9	19
51	20ESKEC057	Kashish Arora	2	2	2	1.5	-	3.5	5	-	16	8	24
52	20ESKEC058	Kashish Jagwani	1	1.5	0.5	1.5	0	-	5	-	9.5	9	19
53	20ESKEC059	Kashish Karamchandani	2	2	2	-	0	0	-	0	6	9	15
54	20ESKEC060	Kashish Sharma	2	1.5	2	3.5	-	4	-	6	19	9	28
55	20ESKEC062	Khushi Garg	2	2	1.5	3	-	3.5	5	-	17	10	27
56	20ESKEC063	Kirti Sagar	1	1.5	2	2.5	-	3.5	1	-	11.5	9	21
57	20ESKEC065	Kushal Tambi	2	1	2	-	1	3.5	5	-	14.5	9	24
Total No. of DEBARRED (DB)			1	1	1	1	1	1	1	1			
Total No. of ABSENT (AB)			3	3	3	3	3	3	3	3			
Total Students Appeared for Exam			53	53	53	53	53	53	53	53			
Total Students Attempted the Question (A)			53	53	53	35	27	44	44	9			
No. of Students scored >=50% marks (B)			49	49	46	20	12	37	35	2			
Percentage Attainment of Criterion (B/A)			92.45	92.45	86.79	57.14	44.44	84.09	79.55	22.22			
CO Attainment Level			3	3	3	1	1	3	3	1			
Attainment of CO-1			Nil	Nil									
Attainment of CO-2			Nil	Nil									
Attainment of CO-3			Nil	Nil									
Attainment of CO-4			80%	3									
Attainment of CO-5			74%	3									
Criterion of Percentage for CO Attainment Level			Attainment Level										
Percentage attainment Below 60%			1										
Percentage attainment 60%-69.99%			2										
Percentage attainment Above and equal to 70%			3										

Abhinandan Jain *Abhinandan Jain*  
Faculty name with signature

CO's Attainment (Theory Mid Term : II)

Department: ~~ITC~~ ECE

Faculty Name: Rajni idwal

Course Name with CODE: 6EC4-05

Sub Name - ITC

Upon successful completion of this course, students will be able to:

CO1: Define the amount of information per symbol and information rate of a discrete memory less source.

CO2: Define the amount of information per symbol and information rate of a discrete memory less source.

CO3: Apply lossless source codes for discrete memoryless source to improve the efficiency of information.

CO4: Apply different channel coding techniques for error detection and correction schemes.

CO5: Apply different channel coding techniques for error detection and correction schemes.

## MID TERM EVALUATION

Section-~~A~~

S.NO.	ROLL NO	PART → Note → QUESTION NO. → COURSE OUTCOME(S) SATISFIED → MAXIMUM MARKS → MINIMUM QUALIFYING MARKS (50%) → NAME OF STUDENT ↓	MID TERM EVALUATION								Section- <del>A</del>		
			A			B			C		Total (20)	Assignmen t (10)	Total (30)
			Attempt All			Attempt Any Two			Attempt Any One				
			Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8			
			CO4	CO4	CO4	CO4	CO4	CO5	CO4	CO5			
			2	2	2	4	4	4	6	6			
1	1	1	2	2	2	3	3						
1	20ESKEC066	Lakshit Jain	1	1	1	NA	1.5	3	NA	NA	7.5	10	17.5
2	20ESKEC067	Lakshya Verma	2	2	2	NA	4	3	NA	NA	13	10	23
3	20ESKEC068	Lavina Lahoty	2	2	2	4	NA	4	4	NA	18	10	28
4	20ESKEC070	Manan Sharma		2	1.5	3	NA	3	5	NA	14.5	10	24.5
5	20ESKEC071	Mayank Sharma	1	2	2	2	NA	3	NA	2	12	10	22
6	20ESKEC072	Megha Jangid	2	2	2	3	4	NA	6	NA	19	10	29
7	20ESKEC073	Mohit Kumar Singh	1	NA	1	NA	NA	NA	NA	NA	2	NS	2+NS
8	20ESKEC074	Mohit Yadav	2	2	2	4	NA	3	NA	4	17	10	27
9	20ESKEC075	Moksh Avasthi	2	2	2	3.5	NA	2	6	NA	17.5	10	27.5
10	20ESKEC076	Muskan Meena	2	2	2	4	NA	4	6	NA	20	10	30
11	20ESKEC077	Naman Agarwal	2	2	2	4	3	NA	4	NA	17	10	27
12	20ESKEC079	Navdeep Choudhary	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	AB+NS
13	20ESKEC080	Navneet Kumar	NA	NA	3	NA	NA	NA	NA	NA	3	10	13
14	20ESKEC081	Niharika Chugh	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10
15	20ESKEC083	Om Jaiswal	2	NA	2	NA	5	NA	NA	NA	9	10	19
16	20ESKEC084	Om Verma	2	1.5	1.5	NA	NA	NA	6	NA	11	10	21
17	20ESKEC085	Param Agarwal	DB	DB	DB	DB	DB	DB	DB	DB	DB	NS	DB+NS
18	20ESKEC087	Pawani Bhardwaj	2	2	2	3	NA	3	6	NA	18	10	28
19	20ESKEC088	Prachi Dhiliwal	2	2	2	2	NA	3.5	NA	NA	11.5	10	21.5
20	20ESKEC089	Pradeep Bhat	2	2	NA	NA	NA	NA	NA	NA	4	10	14
21	20ESKEC090	Prajawal Nirvan	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10
22	20ESKEC091	Prashansha Khandelwal	2	2	2	NA	4	4	6	NA	20	10	30
23	20ESKEC092	Pratyush Saraswat	DB	DB	DB	DB	DB	DB	DB	DB	DB	9	DB+9
24	20ESKEC093	Prince Singhal	2	1.5	2	3	NA	3	5	NA	16.5	10	26.5
25	20ESKEC094	Priya Gupta	2	2	2	NA	2.5	3	5	NA	16.5	10	26.5
26	20ESKEC095	Pulkit Sharma	2	2	NA	NA	3	3	5	NA	15	10	25
27	20ESKEC096	Purvi Tanwar	2	2	2	NA	3.5	4	6	NA	19.5	10	29.5
28	20ESKEC097	Radhika Ojha	2	2	1.5	NA	4	3	NA	2	14.5	10	24.5
29	20ESKEC099	Raghav Gupta	2	1	1.5	NA	NA	1	NA	NA	5.5	10	15.5

20ESKEC100	Ritu Yadav	2	2	1.5	NA	4	3	3	NA	15.5	10	25.5
20ESKEC101	Rohit Jarwal	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10
20ESKEC102	Sahil Yadav	2	1	1.5	4	3	NA	6	NA	17.5	10	27.5
20ESKEC103	Sakshi Singh	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10
20ESKEC104	Sambhav Jain	NA	NA	NA	NA	NA	NA	NA	NA	1	10	11
20ESKEC105	Samridhi	1	2	2	4	NA	3	NA	2	14	10	24
20ESKEC106	Samyak Jain	NA	2	1.5	NA	3.5	4	5	NA	16	10	26
20ESKEC107	Sanchit Agrawal	1	2	2	NA	2	3.5	6	NA	16.5	10	26.5
20ESKEC109	Shikha Kumari	NA	1	1	NA	2	1.5	4	NA	9.5	10	19.5
20ESKEC110	Shivani Lamba	2	NA	1	2	NA	4	5	NA	14	10	24
20ESKEC111	Siddharth Choabey	1	2	2	3	NA	2.5	5	NA	15.5	10	25.5
20ESKEC112	Sooraj Pachouri	1.5	2	1.5	3.5	NA	3	6	NA	17.5	10	27.5
20ESKEC113	Sunil Kumawat	1	2	2	4	NA	2.5	6	NA	17.5	10	27.5
20ESKEC114	Suraj Singh Shekhawat	NA	NA	NA	NA	NA	NA	1	NA	1	10	11
20ESKEC115	Swati Aggarwal	1	2	2	4	NA	4	6	NA	19	10	29
20ESKEC116	Tanish Khandal	1	0.5	0.5	NA	1.5	NA	NA	1.5	5	10	15
20ESKEC117	Tushar Vijayvargia	1.5	1	1.5	NA	3	3	6	NA	16	10	26
20ESKEC118	Umang Sharma	1	2	2	NA	4	3	6	NA	18	10	28
20ESKEC119	Utkarsh Bhargava	1	1	1	NA	NA	1	NA	2	6	10	16
20ESKEC120	Utkarsh Gautam	1	1	1	NA	2	1.5	NA	2.5	9	10	19
20ESKEC121	Utkarsh Khandelwal	2	0.5	1	2	3.5	NA	NA	2	11	10	21
20ESKEC122	Vaibhav Kunal	1.5	2	NA	3	NA	2.5	NA	3.5	12.5	10	22.5
20ESKEC123	Vipasha Goyal	2	2	2	NA	3	4	6	NA	19	10	29
20ESKEC124	Vishal Moud	2	2	1.5	NA	3	3.5	4	NA	16	10	26
20ESKEC125	Yash Bairwa	NA	NA	NA	1	NA	2	NA	NA	3	10	13
20ESKEC127	Yatin Parmar	AB	AB	AB	AB	AB	AB	AB	AB	AB	10	AB+10
20ESKEC300	Somik Choudhary	1	2	2	NA	NA	NA	NA	NA	5	10	15
20ESKEC301	Kushmay Porwal	1.5	1	1	NA	NA	NA	NA	NA	3.5	NS	3.5+NS
20ESKEC302	Chandan Kumar	1	2	1	NA	NA	2	5	NA	11	10	21
20ESKEC303	Hemant Ameta	1	NA	NA	NA	NA	NA	NA	NA	1	10	11
20ESKEC304	Kartik Somani	AB	AB	AB	AB	AB	AB	AB	AB	AB	NS	AB+NS
20ESKEC305	Manav Rathore	2	1	1	1.5	NA	2	NA	NA	7.5	10	17.5
20ESKEC306	Sourav Majee	1	1	1	0	NA	0.5	NA	NA	3.5	10	13.5
21ESKEC200	Amisha Jha	2	2	2	NA	4	4	6	NA	20	10	30
<b>Total No. of DEBARRED (DB)</b>		2	2	2	2	2	2	2	2			
<b>Total No. of ABSENT (AB)</b>		7	7	7	7	7	7	7	7			
<b>Total Students Appeared for Exam</b>		54	54	54	54	54	54	54	54			
<b>Total Students Attempted the Question (A)</b>		47	46	48	23	23	39	30	9			
<b>No. of Students scored &gt;=50% marks (B)</b>		47	44	47	20	21	34	29	2			
<b>Percentage Attainment of Criterion (B/A)</b>		100.00	95.65	97.92	86.96	91.30	87.18	96.67	22.22			
<b>CO Attainment Level</b>		3	3	3	3	3	3	3	3			
<b>Attainment of CO-1</b>		NIL	NIL									
<b>Attainment of CO-2</b>		NIL	NIL									
<b>Attainment of CO-3</b>		NIL	NIL									
<b>Attainment of CO-4</b>		95%	3%									
<b>Attainment of CO-5</b>		55%	1									
<b>Criterion of Percentage for CO Attainment Level</b>		<b>Attainment Level</b>										
<b>Percentage attainment Below 60%</b>		1										
<b>Percentage attainment 60%-69.99%</b>		2										
<b>Percentage attainment Above and equal to 70%</b>		3										

Rajni Idwal

Faculty name with signature