

UNIVERSAL HUMAN VALUES**(Common to CE, EEE, ME & ECE Branches)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		<u>UNIT-I</u>	Marks	CO	BTL
1.	a)	Describe the value education and provide basic principles for understanding human values in modern society.	7	1	K2
	b)	Apply the concept of self-exploration to explain how an individual can achieve happiness and prosperity in personal and professional life.	7	1	K2
		(OR)			
2.	a)	Explain the relationships between morals, values, and ethics.	7	1	K2
	b)	Establish a structure for inspiring honesty and ethical standards within an organization.	7	1	K2
		<u>UNIT-II</u>			
3.	a)	Compile the basic needs of the "I" (self) and the "body."	7	2	K2
	b)	Explain what is harmony and drop some line why it is more salient for people to be fit and fine.	7	2	K2
		(OR)			
4.	a)	Describe how recognize the body as a tool for the "I" can help someone live a better life.	7	2	K2
	b)	Give feasible plans for how to lead the "I" and the body together in day-to-day life.	7	2	K2
		<u>UNIT-III</u>			
5.	a)	Define the Respect (Samman) in human-human relationships.	7	3	K1
	b)	Explain the idea of harmony in the family and its significance for a well-being of society.	7	3	K2
		(OR)			
6.	a)	Briefly explain how family connections can be strong and power full via trust (Vishwas)?.	7	3	K2
	b)	What are the key principles of interpersonal relationships and how they contribute to societal harmony?	7	3	K2
		<u>UNIT-IV</u>			
7.	a)	Explain what co-existence is and how it fits into the idea of whole existence.	7	4	K2
	b)	Explain how the four orders of nature are connected and work together to make each other better.	7	4	K2
		(OR)			
8.	a)	Explain how recyclability and self-regulation materialize in nature?	7	4	K2
	b)	Discuss the holistic insight of harmony at all aspects of existence.	7	4	K2
		<u>UNIT-V</u>			
9.	a)	What is humanistic education, and why humanistic education significance in human existence?	7	5	K2
	b)	Describe how Natural Acceptance on Universal Human Values.	7	5	K2
		(OR)			
10.	a)	A) How do self-discovery and natural acceptance lead to ethical human behaviour?	7	5	K2
	b)	B) Discuss about how the Humanistic Universal Order can help the world become more peaceful and harmonious.	7	5	K2

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

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All parts of the Question must be answered at one place

UNIT-I

- | | | Marks | CO | BTL |
|-------|--|-------|-----|-----|
| 1. a) | A die is thrown 5 times. If getting a number greater than 4 is a success, find:(i) at least one success(ii) exactly 2 successes. Using Binomial distribution. | 7M | CO1 | L1 |
| b) | A company knows that 3% of its products are faulty. A shipment contains 150 items. What is the probability that more than 5 items are defective? Using Poisson distribution. | 7M | CO1 | L1 |

(OR)

- | | | | | |
|----|---|-----|-----|----|
| 2. | The heights of 800 students are normally distributed with mean 170 cm and standard deviation 8 cm. Find: (i) Number of students taller than 180 cm
(ii) Height below which 15% of student's fall
(iii) Range containing the central 80% of students | 14M | CO1 | L1 |
|----|---|-----|-----|----|

UNIT-II

- | | | | | |
|-------|---|----|-----|----|
| 3. a) | Determine the sample size required to estimate an unknown proportion with margin of error 0.02 at 95% confidence. | 7M | CO2 | L3 |
| b) | A sample of size 36 has mean 60 and variance 25. Construct a 90% confidence interval for the population mean. | 7M | CO2 | L3 |

(OR)

- | | | | | |
|----|---|-----|-----|----|
| 4. | A population consists of the numbers 1, 2, 3, 6. Consider all possible distinct samples of size 2 without replacement. Find:(i) Population mean(ii) Population standard deviation(iii) Sampling distribution of sample means(iv) Mean of sample means(v) Standard deviation of sample means | 14M | CO2 | L3 |
|----|---|-----|-----|----|

UNIT-III

- | | | | | |
|----|--|-----|-----|----|
| 5. | Two samples of sizes 900 and 1600 have means 72 and 74. Test whether the difference in means is significant if the population standard deviation is 5. Using Z-Test for difference of means. | 14M | CO3 | L3 |
|----|--|-----|-----|----|

(OR)

- | | | | | |
|----|---|-----|-----|----|
| 6. | It is believed that 40% of voters support a candidate. In a survey of 250 voters, 120 support the candidate. Test whether the proportion has changed at 5% level. Using Z-Test for single proportion. | 14M | CO3 | L3 |
|----|---|-----|-----|----|

UNIT-IV

- | | | | | |
|----|--|-----|-----|----|
| 7. | The average weight of packets produced by a company is claimed to be 500 g. A sample of 10 packets shows mean weight 490 g and S.D. 15 g. Test the claim at 5% level. Using t-Test for single mean.
(Given $t_{0.05}$ for 9 d.f. = 2.262) | 14M | CO4 | L3 |
|----|--|-----|-----|----|

(OR)

- | | | | | |
|----|--|-----|-----|----|
| 8. | A sample analysis of examination results of 600 students showed: 260 failed, 180 secured third class, 120 secured second class, 40 got first class. Do these figures agree with the general result ratio 4 : 3 : 2 : 1?. Using Chi-Square test for independence of attributes. | 14M | CO4 | L3 |
|----|--|-----|-----|----|

UNIT-V

- | | | | | |
|----|---|-----|-----|----|
| 9. | Determine the correlation coefficient r for the following data:
X: 20, 22, 25, 27, 30, 32, 35
Y: 18, 20, 23, 25, 28, 30, 33 | 14M | CO5 | L5 |
|----|---|-----|-----|----|

(OR)

- | | | | | |
|-----|---|-----|-----|----|
| 10. | Determine the rank correlation coefficient for the following data:
Marks in Test 1 (X):5, 7, 9, 9, 6, 8, 10, 4, 7, 6
Marks in Test 2 (Y):6, 8, 7, 10, 5, 9, 10, 5, 8, 7 | 14M | CO5 | L5 |
|-----|---|-----|-----|----|

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

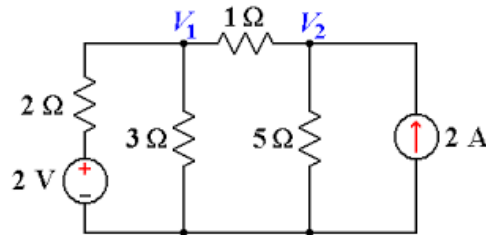
All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain KCL and KVL with an Example
b) Using Nodal Analysis find V_1 and V_2 .

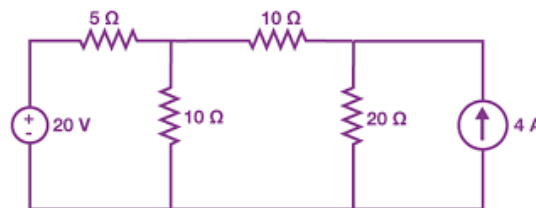
Marks	CO	BTL
5M	CO1	L2
5M	CO1	L3



(OR)

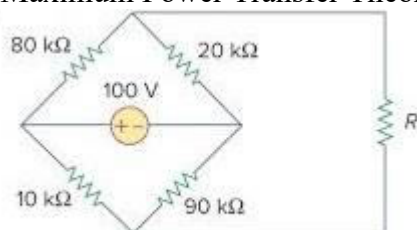
2. a) Explain Superposition Theorem with example.
b) Find Current Through 20Ω resistor using Superposition Theorem.

5M	CO1	L2
5M	CO1	L3

**UNIT-II**

3. a) Derive Maximum Power transfer theorem condition for DC Circuits.
b) Calculate R using Maximum Power Transfer Theorem.

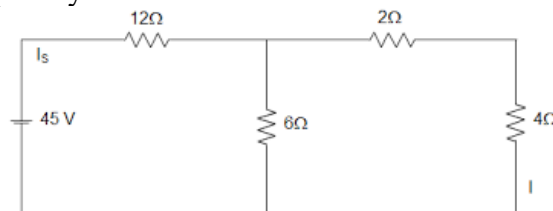
5M	CO2	L2
5M	CO2	L3



(OR)

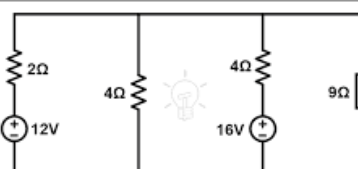
4. a) Verify Reciprocity Theorem for the circuit Shown below.

5M	CO2	L3
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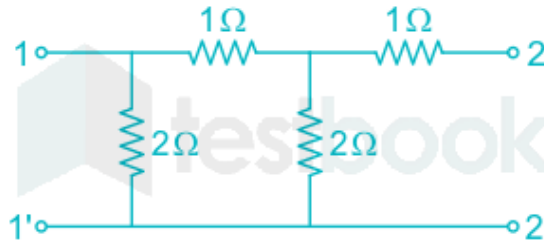
- b) Find Current Through 2Ω using Millman's, Theorem.

5M	CO2	L3
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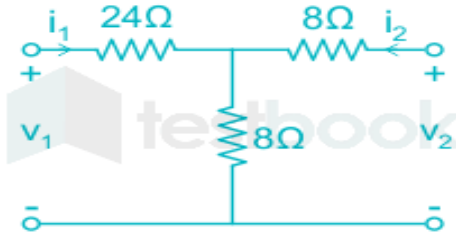
UNIT-III

- | | | | | |
|----|--|----|-----|----|
| 5. | a) Derive the relation between Z and Y parameters. | 5M | CO3 | L2 |
| | b) Find Z- Parameters for the following circuit | 5M | CO3 | L3 |



(OR)

- | | | | | |
|----|---|----|-----|----|
| 6. | a) Derive the relation between Z and ABCD parameters. | 5M | CO3 | L2 |
| | b) Find Y- Parameters for the following circuit. | 5M | CO3 | L3 |



UNIT-IV

- | | | | | |
|----|---|----|-----|----|
| 7. | a) Define (i) Resonance frequency (ii) Bandwidth (iii) Q-Factor | 5M | CO4 | L1 |
| | b) A series RLC circuit with $R = 10\Omega$, $L = 1 \text{ mH}$ and $C = 1000 \mu\text{F}$ is connected across a sinusoidal source of 20V with variable frequency (a) Compute the resonant frequency of the circuit (b) Find the Q factor of the circuit at the resonant frequency (c) Determine the half power frequencies. | 5M | CO4 | L3 |

(OR)

- | | | | | |
|----|---|-----|-----|----|
| 8. | Derive the expression for the resonant frequency of a Series RLC Circuit. Also Derive the expression for the current at resonance band width and Quality Factor | 10M | CO4 | L2 |
|----|---|-----|-----|----|

UNIT-V

- | | | | | |
|----|---|----|-----|----|
| 9. | a) Explain the Classification of Filters. | 5M | CO5 | L2 |
| | b) Explain the Applications of Filters. | 5M | CO5 | L3 |

(OR)

- | | | | | |
|-----|---|----|-----|----|
| 10. | a) Explain the comparison between Active and Passive Filters | 5M | CO5 | L2 |
| | b) Define (i) Pass band (ii) Stop band (iii) Cut off Rate frequency in Filters. | 5M | CO5 | L3 |

UNIT-VI

- | | | | | |
|-----|---|-----|-----|----|
| 11. | Derive the Transient Response for series R-L Circuit. | 10M | CO6 | L2 |
| | (OR) | | | |
| 12. | Derive the Transient Response for series R-C Circuit. | 10M | CO6 | L2 |

ENGINEERING MECHANICS
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours

Max Marks: 60

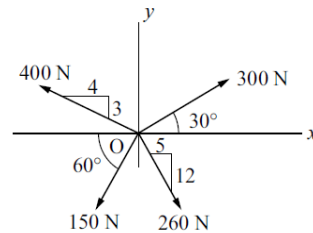
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) State and prove the Parallelogram law of forces.
b) Determine the resultant of four forces acting on a body as shown below.

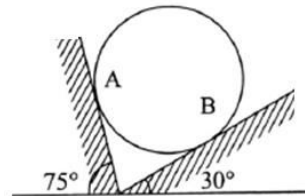


Marks CO Blooms
[4M] CO1 Level
L2

[6M] CO1 L3

(OR)

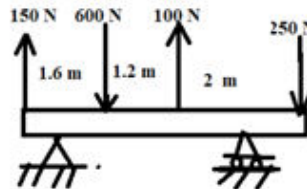
2. A 20 kg homogeneous smooth sphere rests on two inclined planes as shown in figure. Determine the contact forces at A and B.



[10M] CO1 L3

UNIT-II

3. a) Define moment of a force and explain it mathematically.
b) For the beam, reduce the system of forces shown to an equivalent force couple system at B.

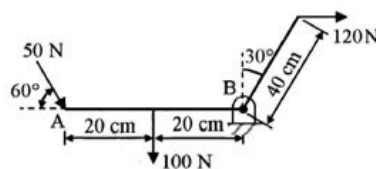


[4M] CO2 L2

[6M] CO2 L3

(OR)

4. a) Discuss the steps involved in finding an equivalent force system.
b) Find the resultant of the forces acting on the bell crank as shown in figure.

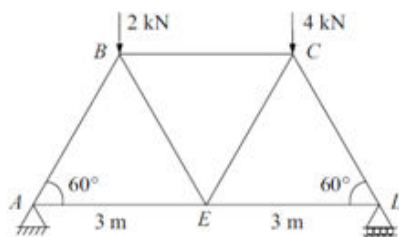


[4M] CO2 L2

[6M] CO2 L3

UNIT-III

5. Find the forces in all members of the pin jointed truss shown in Figure by using method of joints.



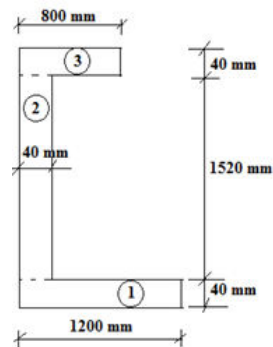
[10M] CO3 L3

(OR)

6. A uniform ladder of length 3.25 m and weighing 250 N is placed against a smooth vertical wall with its lower end 1.25 m from the wall. The coefficient of friction between the ladder and floor is 0.3. What is the frictional force acting on the ladder at the point of contact between the ladder and the floor? [10M] CO3 L3

UNIT-IV

7. Locate the position of centroid for the section shown in Figure

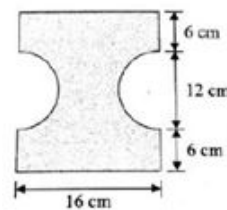


[10M] CO4

L3

(OR)

8. Find the moments of inertia of the cut section shown about the centroidal axes. Two semicircular portions are cut from a rectangular plate.



[10M] CO4

L3

UNIT-V

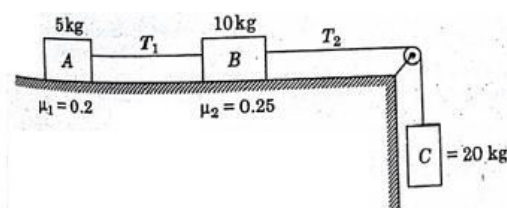
9. a) The motion of a particle is defined by the relation $x = t^3 - 12t^2 + 36t + 30$ where x is expressed in meters and t is in sec. Determine the time, position and acceleration, when $v = 0$. [5M] CO5 L3
- b) A car has an initial speed of 25 m/s and a constant deceleration of 3 m/s^2 . Determine the velocity of the car when $t = 4\text{ s}$. What is the displacement of the car during the 4s time interval? How much time is needed to stop the car? [5M] CO5 L3

(OR)

10. a) A train is uniformly accelerated and passes successive kilometer stones with velocities of 18 km/hr and 36 km/hr respectively. Calculate the velocity when it passes the third kilometer stone. Also find the time taken for each of the two intervals of one kilometer. [5M] CO5 L3
- b) A fly wheel has its angular speed increased from 20 rad/s to 75 rad/s in 100 seconds. If the diameter of the wheel is 2 m, determine the normal and tangential components of the displacement of the point during this time period. [5M] CO5 L3

UNIT-VI

11. Three blocks A, B and C are connected as shown in the Figure. Find acceleration of the masses and the tension T_1 and T_2 in the strings. Given $\mu_1 = 0.2$ and $\mu_2 = 0.25$.

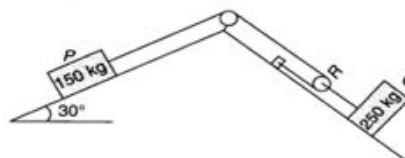


[10M] CO6

L3

(OR)

12. Find the tension in the string as shown in the figure below. Find the tension in the string as shown in the figure below.



[10M] CO6

L3

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

		Marks	CO	Blooms Level
<u>UNIT-I</u>				
1.	Two dice are thrown. Let X assign to each point (a, b) in S the maximum of its numbers $X(a,b) = \max(a,b)$. Obtain the probability distribution, X is a random variable with $X(s) = \{1, 2, 3, 4, 5, 6\}$. Also find the mean and variance of the distribution.	10M	CO1	K5
(OR)				
2.	a) It has been claimed that in 60% of all solar heat installations the utility bills is reduced by at least one-third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in (i) four of five installations (ii) at least four of five installations?	5M	CO1	K5
	b) A manufacturer of cotter pins knows that 5% of his product is defective. Pins are sold in boxes of 100. He guarantees that not more than 10 pins will be defective. Determine the probability that a box will fail to meet the guarantee.	5M	CO1	K5
<u>UNIT-II</u>				
3.	The probability density function of a random variable X is $f(x) = \begin{cases} \frac{1}{2} \sin x, & \text{for } 0 \leq x \leq \pi \\ 0 & , \text{ elsewhere} \end{cases}$ Obtain mean, mode and median of the distribution and also find the probability between 0 and $\pi/2$.	10M	CO2	K3
(OR)				
4.	A university awards distinction, first class, second class, third class or pass class according as the student gets 80% or more; 60% or more; between 45% and 60%; between 30% and 45%; or 30% or more marks respectively. If 5% obtained distinction and 10% failed, determine the percentage of students getting second class. Assume that marks X are normally distributed	10M	CO2	K3
<u>UNIT-III</u>				
5.	A population consists of five numbers 2, 3, 6, 8 and 11. Consider all possible samples of size 2 that can be drawn with replacement from the population. Obtain (a) The mean of the population. (b) The standard deviation of the population. (c) The mean of the sampling distribution of means and (d) The standard deviation of sampling distribution of means	10M	CO3	K5
(OR)				
6.	a) A random sample of size 81 was taken whose variance is 20.25 and mean is 32, construct 98% confidence interval.	5M	CO3	K5
	b) In a study of an automobile insurance a random sample of 80 body repair costs had a mean of Rs. 472.36 and a standard deviation of Rs. 62.35. if \bar{x} is used as point estimate to the true average repair costs, with what confidence we can assert that maximum error does not exceed Rs. 10?	5M	CO3	K5

UNIT-IV

7. a) Explain about null hypothesis and testing of null hypothesis 5M CO4 K3
b) A manufacturer claimed that atleast 95% of the equipment which he supplied to a factory confirmed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 were faulty. Test this claim at 5% level of significance. 5M CO4 K3

(OR)

8. a) Explain the working rule for testing of Hypothesis. 5M CO4 K3
b) A machine runs on an average of 125hours/year. A random sample of 49 machines has an annual average use of 126.9 hours with standard deviation 8.4 hours. Does this suggest to believe that machines are used on the average more than 125 hours annually at 0.05 level of significance? 5M CO4 K3

UNIT-V

9. An insurance agent has claimed that the average age of policyholders who insure through him is less than the average for all agents which is 30.5 years. A random sample of 100 policyholders who had insured through him gave the following age distribution. Calculate the arithmetic mean and standard deviation of this distribution and use these values to test his claim at the 5% level of significance. 10M CO5 K3

Age last birthday	16-20	21-25	26-30	31-35	36-40
No. of persons	12	22	20	30	16

(OR)

10. Test for goodness of fit of a Poisson distribution at 0.05 L.O.S. to the following frequency distribution: 10M CO5 K3

Number of patients arriving/hours: (x)	0	1	2	3	4	5	6	7	8
Frequency	52	151	130	102	45	12	5	1	2

UNIT-VI

11. Determine the correlation coefficient r for the following data: 10M CO6 K5
 X : 63, 50, 55, 65, 55, 70, 64, 70, 58, 68, 52, 60
 Y : 87, 74, 76, 90, 85, 87, 92, 98, 82, 91, 77, 78

(OR)

12. Evaluate Karl Pearson's correlation coefficient for the following paired data. 10M CO6 K5

X	38	45	46	38	35	38	46	32	36	38
Y	28	34	38	34	36	26	28	29	25	36

What inference would you draw from estimate?

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

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UNIT-I

Marks CO BTL

1. Identify whether the function $f(z)$ defined by
- $$f(z) = \begin{cases} \frac{(\bar{z})^2}{z}, & (z \neq 0) \\ 0 & (z = 0) \end{cases}$$
- satisfies Cauchy-Riemann conditions and derivate at origin or not?

10M 1 K3

(OR)

2. If the potential function is $\log \sqrt{x^2 + y^2}$, compute the flux function and the complex potential function.

10M 1 K3

UNIT-II

3. Verify Cauchy's theorem for the function $3\sin 3z$ if C is the square with vertices at $1 \pm i$ and $-1 \pm i$.

10M 2 K4

(OR)

4. Evaluate $\int_C \frac{z-4}{z^2+2z+5} dz$ where C is the circle (i) $|z+1-i|=2$.
(ii) $|z+1+i|=2$.

10M 2 K4

UNIT-III

5. Calculate the residue of $f(z) = \frac{z^3}{(z-1)^3(z-4)(z-3)}$ at the poles.

10M 3 K3

(OR)

6. Show that $\int_0^{2\pi} \frac{d\theta}{\frac{5}{4} + \sin \theta} = \frac{8\pi}{3}$.

10M 3 K3

UNIT-IV

7. If 10% of the rivets produced by a machine are defective, find the probability that out of 5 rivets chosen at random (i) none will be defective (ii) one will be defective, and (iii) at most two rivets will be defective.

10M 4 K3

(OR)

8. The marks obtained in statistics in a certain examination found to be normally distributed. If 15% of the students ≥ 60 marks, 40% of the students < 30 marks, find the mean and standard deviation. 10M 4 K3

UNIT-V

9. Construct S.D. of means for the population 3, 7, 11, 15 by drawing samples of size two with replacement. Determine (a) μ (b) σ (c) S.D.M. (d) $\mu_{\bar{x}}$ (e) $\sigma_{\bar{x}}$. 10M 5 K3

(OR)

10. A random sample of 400 items is found to have mean 82 and S.D. of 18. Find the maximum error of estimation at 95% confidence interval. Find the confidence limits for the mean if $\bar{x} = 82$. 10M 5 K3

UNIT-VI

11. A company claims that the mean thermal efficiency of diesel engines produced by them is 32.3%. To test this claim, a random sample of 40 engines were examined which showed the mean thermal efficiency of 31.4% and s.d of 1.6%. Can the claim be accepted or not, at 0.01 L.O.S.? 10M 6 K3

(OR)

12. Test the hypothesis at 0.05 L.O.S. that the presence or absence of hypertension (HT) is independent of smoking habits from the following experimental data on 180 persons 10M 6 K3

	Non smoke rs	Moderat e smokers	Heavy smoke rs
HT	21	36	30
No HT	48	26	19

AR18

CODE: 18ECT207

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B. Tech II Semester Supplementary Examinations, April-2026

ELECTRO MAGNETIC WAVES & TRANSMISSION LINES

(Electronics and Communication Engineering)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Establish Gauss Law in point form and integral form and hence deduce Laplace's and Poisson's Equations. 6M
b) Explain about different types of charge distributions. 6M
- (OR)
2. a) Derive the expression for electric field at any point due to infinite line charge. 6M
b) Define Electric potential and derive the relationship between electric potential and electric field. 6M

UNIT-II

3. a) Discuss Maxwell's two equations for magneto static fields 6M
b) Define Biot-Savart law? How it will useful to derive H? Explain? 6M
- (OR)
4. a) State Ampere's circuital law. Specify the conditions to be met for determining magnetic field strength H, based on Ampere's circuital law. 6M
b) Find an expression for the magnetic field produced by a straight current carrying conductor at a distance x from it. 6M

UNIT-III

5. a) State and Explain Faraday's law for induced e.m.f. 6M
b) State and explain the boundary conditions of the electric and magnetic fields. 6M
- (OR)
6. a) Write Maxwell's equations in different final forms and in word Statements. 6M
b) If the magnetic field
 $H = [3x\cos\beta + 6y\sin\alpha]a_z$ 6M
Find current density J if fields are invariant with time.

UNIT-IV

7. a) Derive the expression for attenuation constant and phase constant in a lossy dielectric medium. 6M
b) Define Brewster angle and derive an expression for Brewster angle when a wave is parallelly polarized. 6M
- (OR)
8. a) Derive expressions for describing the propagation of uniform plane waves in good conductors. 6M
b) What is skin effect and skin depth and derive the expression for skin depth. 6M

UNIT-V

9. a) Explain i) Single stub and ii) Double stub Matching. 6M
b) A transmission line has following parameters per km
 $R=15\Omega$, $C=15\mu F$, $L=1mH$, $G=1\mu S$ 6M
Find the additional inductance to give distortionless transmission. Calculate α and β for this inductance added transmission line.
- (OR)
10. a) Derive the expression for characteristic impedance of a transmission line. 6M
b) A transmission line has $R=5\Omega/m$, $L=0.1\mu H$, $C=300pF$ and $G=0.01S$ at 500MHz, determine α , β , Z_0 . 6M