Q.P. Code: 18HS0832 **R18**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations November-2020

TRANSFORM & DISCRETE MATHEMATICS

(Common to CE & AGE)

Time: 3 hours Max. Marks: 60

PART-A

(Answer all the Questions **5 x 2 = 10** Marks)

1	**a**	Find $L(\sin^3 2t)$.	**2M**
	b	Write inverse Fourier cosine transform.	**2M**
	c	Define isomorphism of a group.	**2M**
	d	State Inclusion and Exclusion.	**2M**
	e	State Euler's formula.	**2M**

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	**a**	Find $L^{-1}\left\{\frac{1}{(s^2+5^2)^2}\right\}$, using Convolution theorem.	**5M**
	b	Find $L^{-1}\left\{\frac{s^2}{(s^2+4)(s^2+25)}\right\}$, using Convolution theorem.	**5M**

OR

3		Solve $(D^2+1)x = t\cos 2t, x = Dx = 0$ at $t = 0$ by using transform method.	**10M**

UNIT-II

4	**a**	Find the Fourier sine transform of $e^{-\|x\|}$ Hence show that $\int_0^\infty \frac{x\sin mx}{1+x^2}dx = \frac{\pi}{2}e^{-m}, m > 0.$	**5M**
	b	Find the Fourier cosine transform of $2e^{-5x} + 5e^{-2x}$.	**5M**

OR

5		Find the inverse finite sine transform $f(x)$ of $\frac{2\pi(-1)^{n-1}}{n^3}, n = 1,2,3,\ldots$ where $0 < x < \pi$.	**10M**

UNIT-III

6		Show that $(Z_{11}, +_{11})$ is an abelian group.	**10M**

OR

7	**a**	Let $Z_5^* = \{[1],[2],[3],[4]\}$ in which $[1],[2],\ldots..$ have the same meaning as in Z_5 except that $Z_5^* = Z_5 - \{[0]\}$. Also let X_5 is multiplication modulo 5. Show that $g: Z_4 \to Z_5^*$ is given by $g([0]) = [1], g([1]) = [2], g([2]) = [4], g([3]) = [3]$ Defines a homomorphism from the group $(Z_4, +_4)$ to $(Z_5^*, *_4)$. Hence, show that g is group isomorphic.	**5M**
	b	Show that if a, b are arbitrary elements of a group G then $(ab)^2 = a^2b^2$ iff G is abelian.	**5M**

UNIT-IV

8 **a** How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8 and 9 if no Repetitions are allowed. **5M**

b Find the generating function for the sequence 1,1,1,3,1,1,---. **5M**

OR

9 In how many ways can the letters {4a, 3b, 2c} be arranged so that all the letters of same kind are not in a single block. **10M**

UNIT-V

10 **a** Explain In degree and out degree of graph. Also explain about the adjacency matrix representation of graphs. Illustrate with an example. **5M**

b Give an example of a graph that has neither an Eulerian circuit nor a Hamiltonian circuit. **5M**

OR

11 In a connected plane simple graph G, with $|E| > 1$, then prove that **10M**

(i) $|E| \leq 3|V| - 6$, and (ii) there is a vertex v of G such that degree$(v) \leq 5$.

END