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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B Tech II Year I Semester Supplementary Examinations Feb-2021

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 $L\left[t^2+3t+10\right]$	**2M**
	b	Write the formula for Finite Fourier cosine transform.	**2M**
	c	Let $(Z_4, +_4)$, $G=\{1, -1, i, -i\}$ be a multiplicative group. Find the order of every element.	**2M**
	d	State Multinomial theorem.	**2M**
	e	Define regular graph.	**2M**

PART-B

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

UNIT-I

2	a	Find the Laplace transform of $f(t)=t\,e^{2t}\sin 3t$.	**5M**
	b	Find $L^{-1}\left[\dfrac{s^2}{(s^2+4)(s^2+25)}\right]$ using Convolution theorem.	**5M**

OR

3	a	Find the Laplace transform of $f(t)=\dfrac{1-\cos at}{t}$.	**5M**
	b	Find $L^{-1}\left[\dfrac{3s-2}{s^2-4s+20}\right]$ by using first shifting theorem.	**5M**

UNIT-II

4	a	Find the Fourier cosine transform of $f(x)=2e^{-5x}+5e^{-2x}$.	**5M**
	b	Find the Finite cosine transform of $f(x)=e^{ax}$ in $(0, l)$.	**5M**

OR

5	a	Find the Fourier sine and cosine transforms of $f(x)=e^{-ax}$, $a>0$ and hence deduce the integrals $\int_0^\infty \dfrac{\cos px}{a^2+p^2}dp$.	**5M**
	b	Find the Fourier cosine transform of $f(x)=\begin{cases} x, & \text{for } 0<x<1 \\ 2-x, & \text{for } 1<x<2 \\ 0 & \text{for } x>2 \end{cases}$	**5M**

UNIT-III

6 **a** The necessary and sufficient condition for a non-empty sub-set H of a Group (G, *) to be a sub group is $a \in H, b \in H \Rightarrow a * b^{-1} \in H$. **5M**

b Show that if a, b are arbitrary elements of a group G then $(ab)^2 = a^2 b^2$ **if and only if** G is abelian. **5M**

OR

7 **a** Prove that the set Z of all integers with the binary operation $*$, defined as $a * b = a + b + 1$, $\forall a, b \in Z$ is an abelian group. **5M**

b Prove that the kernel of a homomorphism from $(G, *)$ to (H, Δ) is a subgroup of $(G, *)$. **5M**

UNIT-IV

8 **a** In how many ways can a committee of 5 teachers and 4 students be chosen from 9 teachers and 15 students with at least 2 students in each committee. **5M**

b Out of 9 girls and 15 boys how many different committees can be formed each consisting of 6 boys and 4 girls. **5M**

OR

9 **a** Solve the RR $a_{n+2} - 2a_{n+1} + a_n = 2^n$ with initial condition $a_0 = 0$, $a_1 = 1$. **5M**

b Determine the sequence generated by $f(x) = 7e^{8x} - 4e^{3x}$. **5M**

UNIT-V

10 **a** Define the following graph with one suitable example for each graphs **5M**
(i) spanning tree (ii) sub graph (iii) induced sub graph (iv) spanning sub graph.

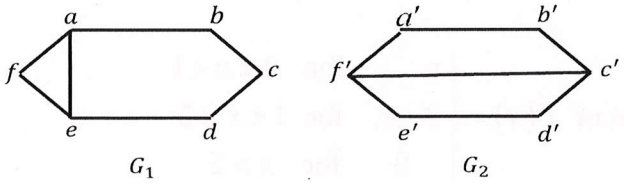
b Draw the graph represented by given Adjacency matrix. **5M**

(i) $\begin{bmatrix} 1 & 2 & 0 & 1 \\ 2 & 0 & 3 & 0 \\ 0 & 3 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$ (ii) $\begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$

OR

11 **a** A graph G has 21 edges, 3 vertices of degree4 and the other vertices are of degree 3. Find the number of vertices in G. **5M**

b Is the following pairs of graphs are isomorphic or not. **5M**



G_1 G_2

END