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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B Tech II Year I Semester (R18) Supplementary Examinations August 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 the Laplace transform of $e^{at}\cosh bt$.	2M
	b	Show that $F_s\left[x f(x)\right] = -\frac{d}{ds}\left[F_c(s)\right]$.	2M
	c	Define isomorphism of a group.	2M
	d	State Generating Function.	2M
	e	State Euler's formula.	2M

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

UNIT-I

2	a	Find the Laplace transform of $f(t) = e^{3t}(2\cos 5t - 3\sin 5t)$.	5M
	b	Find the Inverse Laplace transform of $\frac{1}{s^2(s^2+a^2)}$.	5M

OR

3	a	Find the Laplace transform of $f(t) = \int_0^t e^{-t}\cos t\, dt$.	5M
	b	Find $L^{-1}\left[\frac{1}{2}\log\left(\frac{s^2+a^2}{s^2+b^2}\right)\right]$, using Convolution theorem.	5M

UNIT-II

4	a	Find the Fourier cosine transform of $e^{-ax}\cos ax,\ a>0$.	5M
	b	Find the finite Fourier sine transform of $f(x) = \begin{cases} x, & 0 \le x \le \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} \le x \le \pi \end{cases}$	5M

OR

5	a	Find the Fourier sine and cosine transforms of $f(x) = e^{-ax}$, $a>0$ and hence deduce the integrals $\int_0^\infty \frac{p\sin px}{a^2+p^2}dp$	5M
	b	If F(p) is the complex Fourier transform of f(x), then prove that $F\left[f(x)\cos ax\right] = \frac{1}{2}\left[F_s(p+a) + F_s(p-a)\right]$.	5M

UNIT-III

6 a Show that the set of all roots of the equation $x^4 = 1$ forms a group under multiplication. 5M

b In a group G for $a, b \in G$, $O(a) = 5$, $b \neq e$ and $aba^{-1} = b^2$. Show that $O(b) = 31$. 5M

OR

7 a Show that the set of all rational numbers forms an abelian group under the composition defined by $a * b = \frac{ab}{2}$. 5M

b On the set Q of all rational number operation $*$ is defined by $a * b = a + b - ab$. Show that this operation Q forms a commutative monoid. 5M

UNIT-IV

8 a In how many ways can the letters of the word COMPUTER be arranged? How many of them begin with C and end with R.? How many of them do not begin with C but end with R. 5M

b Solve $a_n = a_{n-1} + 2a_{n-2}$, $n \geq 2$ with initial conditions $a_0 = 0$, $a_1 = 1$. 5M

OR

9 a How many integral solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where (i) each $x_i \geq 2$ (ii) each $x_i > 2$. 5M

b Solve $a_n = 3a_{n-1} - 3a_{n-2} + a_{n-3}$ with initial conditions $a_0 = 0$, $a_3 = 3$, $a_5 = 10$. 5M

UNIT-V

10 a Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$. 5M

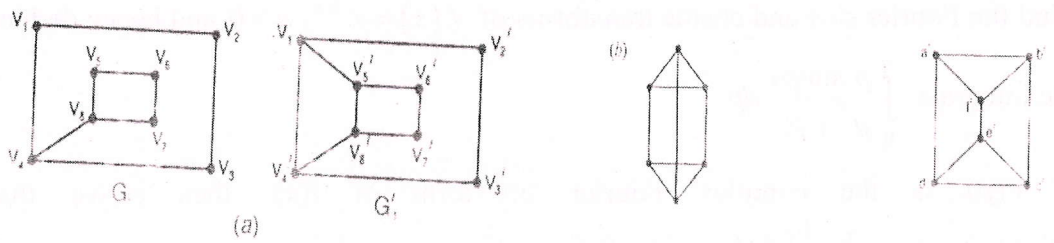
b Draw the graph represented by given Adjacency matrix 5M

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

OR

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

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



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