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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B. Tech II Year I Semester Supplementary Examinations December-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) Evaluate Laplace transform of $e^{at}\cosh bt$. **L5 2M**

b) Find the Fourier transform of $f(x)$, defined by $f(x)=\begin{cases}0, & -\infty<x<\alpha\\ x, & \alpha<x<\beta\\ 0, & x>\beta\end{cases}$ **L1 2M**

c) Let $G=\{1,-1,i,-i\}$ be a multiplicative group. Find the order of every element. **L1 2M**

d) State Generating Function? **L1 2M**

e) Define complete bipartite graph. **L2 2M**

PART-B

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

UNIT-I

2. a) Find the Laplace transform of the function $f(t)=\dfrac{1-\cos at}{t}$ **L1 5M**

b) Find the Laplace transform of $f(t)=\int_0^t e^{-4t}\cos t\,dt$ by using L.T of integrals. **L3 5M**

OR

3. By using Laplace transform technique, solve the D. E. $(D^2+5D+6)y=5e^t$, where $y(0)=2,\ y'(0)=1$. **L3 10M**

UNIT-II

4. a) Find the Fourier sine transform of $e^{-|x|}$. Hence show that $\int_0^\infty \frac{x\sin mx}{1+x^2}dx=\frac{\pi}{2}e^{-m}, m>0.$ **L1 5M**

b) Obtain the Fourier sine transform of $f(x)=\begin{cases}x, & 0<x<1\\ 2-x, & 1<x<2\\ 0, & x>2\end{cases}$. **L3 5M**

OR

5. Find the Fourier sine and cosine transforms of $f(x)=\dfrac{e^{-ax}}{x}$ and deduce that **L1 10M**

$$\int_0^\infty \frac{e^{-ax}-e^{-bx}}{x}\sin px\,dx=\tan^{-1}\left(\frac{p}{a}\right)-\tan^{-1}\left(\frac{p}{b}\right)$$

UNIT-III

6. Define group and an abelian group. Prove that the set Z of all integers with the binary operation $*$ is defined as $a*b=a+b+1,\ \forall a,\ b\in Z$ is an abelian group. **L1 10M**

OR

7. a) 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. **L1 5M**

   b) In a group G for $a,b\in G,\ O(a)=5,\ b\neq e$ and $aba^{-1}=b^2$. Show that $O(b)=31$. **L1 5M**

UNIT-IV

8. a) How many integral solutions are there to where $x_1+x_2+x_3+x_4+x_5=20$ **L3 5M**

   (i) Each $x_i \geq 2$? (ii) Each $x_i > 2$.

   b) 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? **L3 5M**

OR

9. a) Applying pigeon hole principle show that of any 14 integers are selected from the set S = {1,2,3,……..,25 } there are at least two whose seem is 26. Also write a statement that generalizes this result. **L3 5M**

   b) Solve the RR $a_{n+2}-2a_{n+1}+a_n=2^n$ with initial condition $a_0=2$ and $a_1=1$. **L1 5M**

UNIT-V

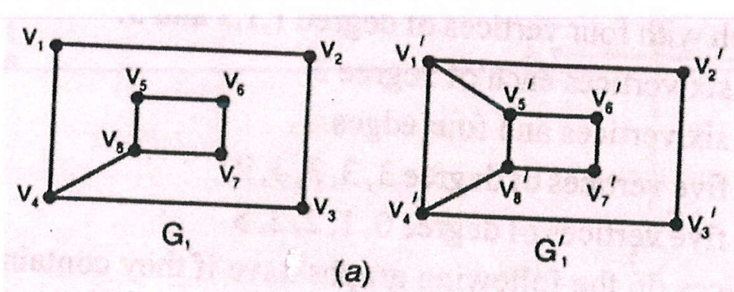
10. a) Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$. **L1 5M**

    b) 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 ?. **L1 5M**

OR

11. a) Explain any 5 graphs with examples. **L4 5M**

    b) Is the following pairs of graphs are isomorphic or not? **L4 5M**



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