

**Question Paper Code: 94021A**

.E. / B.Tech. DEGREE EXAMINATION, MAY 2021

Fourth Semester

Computer science Engineering

19UMA421 - Transforms and Discrete Mathematics

(Regulation 2019)

Common to Information Technology

Duration: 1:45hrs

Maximum: 50 Marks

PART A 10\*2 =20 Marks

Answer any ten of the following questions

1. Examine the truth value of “ $10+3=7$  or  $6$  is not prime”, The truth value of “ $2+3=8$  and  $^{-4}$  is a positive integer” CO1-Ap
2. Derive Q from the premises  $R \rightarrow P, \neg P \vee Q$  and R CO1-Ap
3. Express Let P: We should be honest, Q: We should be dedicated., R: We should be overconfident. Then ‘We should be honest or dedicated but not overconfident.’ Is best represented by? CO1-Ap
4. Calculate how many 6 digits numbers can be formed using the digits  $1,2,3,2,4,2$  CO2- Ap
5. Calculate how many integers between 1 to 400 are divisible by 3 and 6 CO2- Ap
6. Derive the complementary function of  $a_n + 2a_{n-1} + a_{n-2} = 25$  CO2- Ap
7. The binary operation defined as  $a * b = \frac{ab}{5}$  for all  $a, b \in R$  where R is the set of all non-zero real numbers. Determine the inverse of a CO3- Ap
8. For a Group  $G = \{1, -1, -i, i\}$  under multiplication, Determine which element(s) have same inverse(s) CO3- Ap
9. For a Group  $(Z, *)$ ,  $*$  is defined by  $a * b = a + b + 2ab$  then determine identity element of  $(Z, *)$  CO3- Ap
10. Compute Fourier transform of  $\sqrt{2\pi}, 0 < x < 1$  CO4- Ap
11. Compute the Fourier Transform of  $f(x) = \begin{cases} 1; |x| < a \\ 0; |x| > a > 0 \end{cases}$  CO4- Ap
12. Compute Fourier sine transform of  $e^{-5x}$  CO4- Ap
13. Compute the Z-transform of  $\frac{a^n}{n!}$  CO5-Ap
14. Determine the Z-transform of  $z \left( \frac{1}{n+1} \right)$  CO5-Ap
15. Determine the  $Z^{-1}$  transform of  $\frac{z}{(z-6)^2}$  CO5-Ap

PART B

Marks

3\*10 =30

Answer any three of the following questions

- 16 Calculate PCNF and PDNF for  $(P \wedge Q) \vee (\neg P \wedge R) \vee (Q \wedge \neg R)$  CO1 Ap 10
- 17 Calculate the number of positive integers not exceeding 1500 that are CO2- Ap 10  
 (a). divisible by 2,3,5 or by 11  
 (b). divisible by 2 and 3 but not divisible 5
- 18 Let G be a finite group of order 'n' and H be any subgroup of G . Then CO3- Ap 10  
 Show that the order of H divides the order of G. (i.e)  $O(H) / O(G)$ .
- 19 Calculate the Fourier cosine transform of  $e^{-ax}$  and hence determine the CO4- Ap 10  
 value of the Integral  $\int_0^{\infty} \frac{dx}{(x^2 + a^2)(x^2 + b^2)}$
- 20 Solve the difference equation  $y_{n+2} - 8y_{n+1} + 15y_n = 2^n$  given that CO5- Ap 10  
 $y_0 = 0, y_1 = 0$