COMP/AIDS/IT

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

April – May 2023
(B.Tech.) Program: B.Tech. (Computer, IT, AI-DS) Scheme: II
Examination: SY/DSY Semester: III
Course Code: CEC301,ITC301,AIC301 and Course Name: Applications of Mathematics in Engineering-I

Date of Exam: 25th May, 2023 Duration: 2.5 Hours Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	Find L(sin t cos t)	2	1	Ap
ii)	Find $L^{-1}\left(\frac{s+2}{S^2-4S+13}\right)$	2	2	Ap
iii)	Verify whether the function f(z) = e^z is analytic?	2	4	Ap
iv)	Find the Fourier coefficient a_0 of $f(x) = x$ in (0,2).	2	3	
v)	Find $L\left(\frac{d}{dt}\left(\frac{\sin 3t}{t}\right)\right)$	2	1	Ap
vi)	Show that the function is harmonic u = $x^2 - y^2$.	2	4	Ap
vii)	A variate X has the following probability distribution x: -3, 6, 9 P(x): 1/6, 1/2, 1/3 Find E(X)	2	6	Ap
viii)	State whether true or false and justify your answer: Both the coefficients of regression always have same sign.	2	5	Ap
Q2	Solve any four questions out of six.	16		
i)	Find Laplace transform of t cos t.	4	1	Ap
ii)	Find the Inverse Laplace Transform of $\tan^{-1}(s+1)$.	4	2	Ap
iii)	Find the orthogonal trajectory of the family of the curves $x^3y - xy^3 = c$	4	4	Ap

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

April – May 2023
(B.Tech.) Program: B.Tech. (Computer, IT, AI-DS) Scheme: II
Examination: SY/DSY Semester: III
Course Code: CEC301,ITC301,AIC301 and Course Name: Applications of Mathematics in Engineering-I

Date of Exam: 25th May, 2023 Duration: 2.5 Hours Max. Marks: 60

iv)	Calculate Spearman's rank correlation coefficient R from the given data X: 12, 17, 22, 27, 32 Y: 113, 119, 117, 115, 121	4	5	Ap
v)	Expand x^3 , $-\pi < x < \pi$ as a Fourier series.	4	3	Ap
vi)	A continuous random variable has p.d.f $f(x) = 6(x - x^2)$, $0 \le x \le 1$, find mean and variance.	4	6	Ap
Q.3	Solve any two questions out of three.	16		
i)	Find Laplace transform of $\frac{e^{-2t}\sin 2t \cosh t}{t}$	8	1	Ap
ii)	Calculate Karl Pearson correlation coefficient for the following data x: 23, 27, 28, 29, 30, 31, 33, 35, 36, 39 y: 18, 22, 23, 24, 25, 26, 28, 29, 30, 32	8	5	Ap
iii)	Find the Fourier expansion for the following functions $f(x) = x^2$ in $(-\pi, \pi)$ and hence deduce that $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\ldots\ldots=\frac{\pi^2}{6}$	8	3	Ap
Q.4	Solve any two questions out of three.	16		
i)	Find the Inverse Laplace Transform of the following function using convolution theorem $\frac{1}{(s-1)(s^2+4)}$	8	2	Ap
ii)	The p.d.f of a random variable x is X: 0, 1, 2, 3, 4, 5, 6 P(X=x): k, 3k, 5k, 7k, 9k, 11k, 13k Find (i) k , (ii) $P(X<4)$, (iii) $P(3 < X \le 6)$.	8	6	Ap
iii)	Show that the following functions are harmonic and find the harmonic conjugate of the following functions & $f(z) = u + iv$ in terms of z. $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 2x + 1$	8	4	Ap

****