Jan./Feb. ~~Nov – Dec~~ 2025

Program: B. Tech (Computer/Information Technology/AI-DS Engineering)   Scheme: III
~~Supplementary~~ ~~Regular~~ Examination: SY Semester: III
Course Code: CEC301/ITC301/AIC301 and Course Name: Applications of Mathematics in Engineering-I
Date of Exam: ~~25/11/2025~~   Duration: 2 Hours 30 Minutes   Max. Marks: 60
29/01/2026

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

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three: (05 marks each)	10		
a)	Evaluate $\int_0^\infty e^{-2t} t^2 \sin 3t \; dt$		1	3
b)	Obtain Fourier series of $f(x) = x \cos x$ in $(-\pi, \pi)$.		3	3
c)	In a bolt factory, machines A, B and C manufacture respectively 25%, 35% and 40% of their total. Their output 5, 4 and 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine B.		6	3
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	Show that function $u(x, y)$ is harmonic and find the corresponding analytic function $f(z) = u + iv$, where $u = \frac{1}{2}\log(x^2 + y^2)$.		4	3
b)	Calculate Karl Pearson's coefficient of correlation from the data. x : 28, 45, 40, 38, 35, 33, 40, 32, 36, 33. y : 23, 34, 33, 34, 30, 26, 28, 31, 36, 35.		5	3
c)	Find the inverse Laplace Transform of $\frac{5s^2 - 15s - 11}{(s+1)(s-2)^2}$.		2	3
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	Find the Laplace transform of the following functions (i) $\frac{d}{dt}\left(\frac{1 - \cos 2t}{t}\right)$ (ii) $\int_0^t u\, e^{-3u} \cos^2 2u \; du$	6 4	1	3

Jan / Feb ~~Nov – Dec 2025~~

Program: B. Tech (Computer/Information Technology/AI-DS Engineering)   Scheme: III / II / II B

Supplementary   ~~Regular~~ Examination: SY Semester: III

Course Code: CEC301/ITC301/AIC301 and Course Name: Applications of Mathematics in Engineering-I

Date of Exam: ~~25/11/2025~~   Duration: 2 Hours 30 Minutes   Max. Marks: 60

09/01/2026

b)	(i) Find k, mean and the variance of X if the probability density of a random variable is given by $f(x) = \begin{cases} kxe^{-\frac{x}{3}} & , \quad x > 0 \\ 0 & , x \le 0 \end{cases}$	6	6	3
	(ii) Find the first two moments and M.G.F. of the RV X about origin whose p.m.f. is given by <table><tr><td>X</td><td>-2</td><td>3</td><td>1</td></tr><tr><td>P(X = x)</td><td>1/3</td><td>1/2</td><td>1/6</td></tr></table>	4	6	3
c)	i) Find the analytic function in terms of z if $u + v = \frac{x}{x^2 + y^2}$.	6	4	3
	ii) Show that the function $w = \log z$ is analytic except at $z = 0$.	4	4	3
Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a)	(i) Obtain the Fourier series for the function $f(x) = \begin{cases} \pi x & , 0 \le x \le 1 \\ 0 & , 1 \le x \le 2 \end{cases}$ Deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} \ldots = \frac{\pi^2}{8}$	6	3	3
	(ii) Find the Fourier Transform of $f(x) = \begin{cases} 1 - x^2, & |x| \le 1 \\ 0 & , |x| > 1 \end{cases}$	4	3	3
b)	(i) Find $L^{-1}\left(\frac{s^2}{(s^2+1)(s^2+4)}\right)$ by using convolution theorem.	6	2	3
	(ii) Find the inverse Laplace Transform of $\tan^{-1}\left(\frac{2}{s^2}\right)$.	4	2	3

c)	(i) The equation of two lines of regression are $2x - 9y = -6$ and $x - 2y = -1$.
	 Find (a) means of x and y
	    (b) the coefficients of correlation between x and y .
	    (c) the S.D. of y if $Var(x) = 9$
		6	5	3

	(ii) Fit a second-degree curve $Y = a + bx + cx^2$, to the following data. <table><tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Y</td><td>-4</td><td>-1</td><td>4</td><td>11</td><td>20</td></tr></table>	4	5	3

****