



ACE Engineering College

(An Autonomous Institution)

Question Paper Code:

MA401BS

ACE-R20

Semester End Examination
II B. Tech- II Semester- AUGUST -2022
LAPLACE TRANSFORMS, NUMERICAL METHODS AND COMPLEX VARIABLES
ELECTRICAL AND ELECTRONICS ENGINEERING

Time: 3 Hours

Max. Marks: 70

H. T. No

Answer any 5 Questions out of 8 Questions from the following

Q.No	Question	Marks												
1. a)	Solve the following differential equations using Laplace transforms $\frac{d^2y}{dt^2} - 4\frac{dy}{dt} + 3y = e^{-t}, \text{ where } y(0) = 0, y'(0) = 1$	7												
b)	Find $L^{-1}\left[\log\left(\frac{s+2}{s+3}\right)\right]$	7												
2. a)	Find $L^{-1}\left[\frac{s+3}{(s^2+6s+10)^2}\right]$	7												
b)	Find $L[e^{-2t}[2\cos 3t - 3\sin 4t]]$	7												
3. a)	Find a real root of the equation $xe^x = \cos x$ using the regula falsi method and correct to four decimal places.	7												
b)	The population of certain town is shown in the following table <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td>Year</td> <td>1951</td> <td>1961</td> <td>1971</td> <td>1981</td> <td>1991</td> </tr> <tr> <td>population</td> <td>19.96</td> <td>39.65</td> <td>58.81</td> <td>77.21</td> <td>94.61</td> </tr> </table> Estimate the rate of growth the population in the year 1981.	Year	1951	1961	1971	1981	1991	population	19.96	39.65	58.81	77.21	94.61	7
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population	19.96	39.65	58.81	77.21	94.61									
4. a)	State appropriate interpolation formula which is be used to calculate the value of $\exp(1.75)$ from the following data. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td>x</td> <td>1.7</td> <td>1.8</td> <td>1.9</td> <td>2.0</td> </tr> <tr> <td>y=e^x</td> <td>5.474</td> <td>6.050</td> <td>6.686</td> <td>7.389</td> </tr> </table>	x	1.7	1.8	1.9	2.0	y=e ^x	5.474	6.050	6.686	7.389	7		
x	1.7	1.8	1.9	2.0										
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4. b)	Evaluate $\int_0^1 \frac{1}{1+x} dx$ using Simpson's $\frac{3}{8}$ rule.	7
5. a)	Find $y(0.1)$ and $y(0.2)$ using Runge-Kutta 4 th order formula given that $\frac{dy}{dx} = x^2 - y$ and $y(0) = 1$.	7
b)	Using modified Euler method find $y(0.2)$ and $y(0.4)$ given $\frac{dy}{dx} = y + e^x$, $y(0) = 0$	7
6. a)	Find the value of the integral $\oint_c \frac{e^{-z}}{(z+1)^2} dz$ where c is $ z = \frac{1}{2}$.	7
b)	Find the Analytic function whose imaginary part is $\frac{2 \sin x \sin y}{\cos 2x + \cosh 2y}$	7
7. a)	Show that the function is $f(z) = \sqrt{ xy }$ not analytic at the origin even though C-R equations is satisfied.	7
b)	Evaluate $\oint_c \frac{z}{(z-1)(z-2)} dz$ where 'c' is circle $ z-2 = \frac{1}{2}$ by Cauchy integral formula.	7
8. a)	Expand $f(z) = \frac{z^2 - 6z - 1}{(z-1)(z-3)(z+2)}$ in the region $3 < z+2 < 5$	7
b)	Evaluate $\oint_c \frac{2z+1}{(z+1)(z-1)(z+2)} dz$ where 'c' is circle $ z = \frac{3}{2}$ by Cauchy residue theorem.	7