Hall Ticket Number:

Code No. : 12121 AS O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. II-Semester Advanced Supplementary Examinations, September-2023

Engineering Mathematics-II

(Common to all)

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10× 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Define linear independence and dependence of vectors.	2	1	1	1,2,12
2.	State Cayley-Hamilton theorem.	2	2	1	1,2,12
3.	Define Exact differential equation.	2	1	2	1,2,12
4.	Define orthogonal trajectory.	2	1	2	1,2,12
5.	Solve $y'' - 2y' - 3y = 0$.	2	2	3	1,2,12
6.	Write the differential equation governing the LCR circuit.	2	1	3	1,2,12
7.	Define harmonic function.	2	1	4	1,2,12
8.	Write the C-R equations for a function to be analytic.	2	1	4	1,2,12
9.	Define singular point.	2	1	5	1,2,12
10.	State Cauchy's theorem.	2	1	5	1,2,12
	Part-B (5×8 = 40 Marks)				
11. a)	Find the rank of the matrix $\begin{pmatrix} 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 6 \\ 4 & 5 & 6 & 7 \end{pmatrix}$.	4	2	1	1,2,12
b)	Find the eigen values and eigen vectors of the matrix $\begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$.	4	2	1	1,2,12
12. a)	Solve $(x^2 - ay)dx + (ax - y^2)dy = 0$.	4	3	2	1,2,12
b)	Find the orthogonal trajectories of the family of parabolas $y^2 = 4ax$.	4	3	2	
13. a)	Solve $y'' + 4y' - 5y = e^{2x}$.	4	3	3	1,2,12
b)	Solve $y'' + 4y = \tan 2x$ by the method of variation of parameters.	4	3	3	1,2,12
14. a)	Find the analytic function, whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2$.	4	3	4	1,2,12
b)	Show that $f(z) = \bar{z}$ is not analytic at any point using the C-R equations.	4	2	4	1,2,12

Contd... 2

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15. a)	Evaluate $\oint_C \frac{z^2-z+1}{z-1} dz$, where C is $\|z\| = 3$.	4	3	5	1,2,12
b)	Find the Taylor's expansion of $f(z) = \sin z$ about the point $z = 0$.	4	3	5	1,2,12
16. a)	Verify Cayley-Hamilton theorem for the matrix $\begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$.	4	2	1	1,2,12
b)	Find the general and singular solution of the equation $y = px + \sin^{-1} p$.	4	3	2	1,2,12
17.	Answer any ***two*** of the following:				
a)	Solve $y'' + 16y = \cos 2x$.	4	3	3	1,2,12
b)	Show that $u = y + e^x \cos y$ is harmonic function.	4	2	4	1,2,12
c)	Determine the poles of the function $f(z) = \frac{z^2}{(z-1)(z-2)}$ and the residue at each pole.	4	3	5	1,2,12

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

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