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Code No. : 12121 O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade

B.E. II-Semester Backlog Examinations, August-2023

Engineering Mathematics-II

(Common to all Branches)

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 rank of a matrix.	2	1	1	1,2,12
2.	If 1, 2, 3 are the eigen values of a matrix A, then find the eigen values of A^T and A^{-1} .	2	2	1	1,2,12
3.	Write the differential equation governing the LR circuit.	2	1	2	1,2,12
4.	Define integrating factor.	2	1	2	1,2,12
5.	Solve $y'' - 2y' + y = 0$.	2	2	3	1,2,12
6.	Write the differential equation governing the LCR circuit.	2	1	3	1,2,12
7.	Define analytic function.	2	1	4	1,2,12
8.	Write the necessary and sufficient conditions for a function to be analytic.	2	1	4	1,2,12
9.	Define residue at a pole.	2	1	5	1,2,12
10.	State Cauchy's integral formula.	2	1	5	1,2,12
Part-B (5 × 8 = 40 Marks)					
11. a)	Test whether the vectors (2, 1, 1), (2, 0, -1) and (4, 2, 1) are linearly independent or dependent?	4	2	1	1,2,12
b)	Verify Cayley-Hamilton theorem for the matrix $\begin{pmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix}$.	4	2	1	1,2,12
12. a)	Solve $(y \cos x + \sin y + y)dx + (\sin x + x \cos y + x)dy = 0$.	4	3	2	1,2,12
b)	Find the general and singular solution of the equation $p = \log(px - y)$.	4	2	2	
13. a)	Solve $y'' + 5y' + 6y = e^x$.	4	3	3	1,2,12
b)	Solve $y'' + 9y = \sin 2x$.	4	3	3	1,2,12

Contd... 2

14. a)	Find the analytic function, whose real part is $y + e^x \cos y$.	4	3	4	1,2,12
b)	Find the constants a, b, c and d if $f(z) = (ax^3 - 3cxy^2 + 3dx^2 - 3by^2) + i(3x^2y - y^3 + 6xy)$ is analytic.	4	3	4	1,2,12
15. a)	Evaluate $\oint_C \frac{e^z}{(z-1)^2} dz$, where C is $ z = 2$.	4	3	5	1,2,12
b)	Evaluate $\oint_C \left(\frac{\sin z}{z-2} + \frac{\cos z}{z-4} \right) dz$, where C is $ z = 3$.	4	3	5	1,2,12
16. a)	Find the eigen values and eigen vectors of the matrix $\begin{pmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$.	4	2	1	1,2,12
b)	Find the orthogonal trajectories of the family of semi cubical parabolas $ay^2 = x^3$.	4	3	2	1,2,12
17.	Answer any <i>two</i> of the following:				
a)	Solve $y'' - 6y' + 9y = e^{3x}/x^2$ by the method of variation of parameters.	4	3	3	1,2,12
b)	Define harmonic function. Show that $u = \frac{1}{2} \log(x^2 + y^2)$ is harmonic function.	4	2	4	1,2,12
c)	Find the Taylor's expansion of $f(z) = \frac{1}{(z+1)^2}$ about the point $z = 1$.	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%
