Hall Ticket Number:

Code No. : 12221 AS O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

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

Differential Equation & Vector Calculus

(Common to CSE, AIML & IT.)

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 Exact Differential Equation.	2	1	1	1,12
2.	Find the general solution of $ydx - xdy = (x^2 + y^2)dy$	2	2	1	1,2,12
3.	Solve the differential equation $(D^4 - 1)y = 0$.	2	2	2	1,2,12
4.	Evaluate $\frac{1}{D^2+9}cos3x$	2	2	2	1,2,12
5.	What is the physical meaning of curl of a vector point function?	2	1	3	1,12
6.	Find the unit normal vector to the surface $xy^3z^4 - 3x^3y^2z$ at (1,1,2).	2	2	3	1,2,12
7.	State Gauss's Divergence Theorem	2	1	4	1,12
8.	For what value of "β" vector $\bar{F} = (x + 3y)\bar{\imath} + (y - 2z)\bar{\jmath} + (x + \beta z)\bar{k}$ is solenoidal vector.	2	1	4	1,12
9.	Define Beta and Gamma function.	2	1	5	1,12
10.	Prove that $\Gamma(n + 1) = n\Gamma(n)$.	2	1	5	1,2,12
	Part-B (5 × 8 = 40 Marks)				
11. a)	Solve the differential equation $(2x^3y^2 - 2x)dy = (x^2y^3 + 2y)dx$	4	2	1	1,2,12
b)	Find the Orthogonal trajectory of family of curves $x^2 - y^2 = ax$	4	2	1	1,2,12
12. a)	Solve the differential equation $(D^3 - D^2 + 4D - 4)y = e^x$	4	3	2	1,2,12
b)	Find the general solution of $\frac{d^2y}{dt^2} - 2\frac{dy}{dt} + 4y = t^2 - 1$	4	3	2	1,2,12
13. a)	If $\bar{r} = xi + yj + zk$ *and* $\lvert\bar{r}\rvert = r$, then prove that $div\,(r^n\bar{r}) = (n + 3)r^n$	4	3	3	1,2,12
b)	Find the constants a, b such that the surfaces $5x^2 - 2yz - 9x = 0$ *and* $ax^2y + bz^3 = 4$ cut orthogonally at the point (1, -1, 2).	4	2	3	1,2,12

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14. a)	Change the order of Integration and evaluate $\int_{-a}^{a}\int_{0}^{\sqrt{a^2-x^2}} xy\, dydx$	5	3	4	1,2,12
b)	Evaluate $\int_0^1\int_0^2\int_1^2 x^2yz\, dzdydx$	3	2	4	1,2,12
15. a)	Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{tan\,\theta}\, d\theta$ by using Beta-Gamma function.	3	3	5	1,2,12
b)	Prove that $\int_0^\infty e^{-x^4}dx \times \int_0^\infty e^{-x^4}x^2dx = \frac{\pi\sqrt{2}}{16}$	5	3	5	1,2,12
16. a)	Find the general and singular solution of $xp^3 - yp^2 + 1 = 0$. *where* $p = dy/dx$	4	2	1	1,2,12
b)	Solve the differential equation $(D^2 + 4)y = cosec2x$ by method of variation of parameters.	4	3	2	1,2,12
17.	Answer any ***two*** of the following:				
a)	If $\bar{f}$ =grad $(x^3 + y^3 + z^3 - 3xyz)$, then find curl $\bar{f}$	4	2	3	1,2,12
b)	Apply Green's theorem to evaluate $\int_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ Where c is bounded by x=0, y= 0 & x + y=1	4	3	4	1,2,12
c)	State and prove Beta-Gamma relation.	4	1	5	1,12

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	38.75%
iii)	Blooms Taxonomy Level – 3 & 4	41.25%

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