Reg.No. Name:

KERALA AGRICULTURAL UNIVERSITY

FIRST SEMESTER B.TECH (Agrl.Engg) EXAMINATION

COURSE CODE: Sacs.1101

COURSE NAME: ENGINEERING MATHEMATICS - 1

Max. Marks:50 Time: 2Hours

PART – A

Answer all questions. Each question carries 1 mark. (10×1=10)

1. If $z = Cos(2x + 3y^2)$ find $\frac{\partial z}{\partial y}$
2. Necessary and sufficient condition for the differential equation Mdx + Ndy = 0 to be exact is ....
3. $\int_1^2 \int_0^1 12xy\, dxdy$ is ....
4. Complementary function of $(D^2 + 3D + 2)y = 0$ is ....
5. The total derivative of the function z = f(x,y) is ....
6. $J_{-1/2}(x)$ = ...
7. A vector with zero divergence is called ....
8. For a scalar function F, Curl (grad F) = ...
9. The function $f(x,y) = \frac{xy^2 - y^3}{yx^2 + xy^2}$ is a homogeneous function.(TRUE OR FALSE)
10. Rodrigue's formula for $P_n(x)$ is ....

PART-B

Answer any five questions. Each question carries 2 marks (5×2=10)

11. Expand $(1 + x)^m$ in ascending powers of x.
12. Verify Euler's theorem if $f = (ax + by)^{\frac{1}{3}}$
13. Solve (x - 2y + 3)dx - (2x - y + 5)dy = 0
14. Express $3x^3 - x^2 + 5x - 2$ in terms of Legendre polynomial
15. Solve $(D^2 - 4)y = Cos\, 3x$
16. Find Curl f if $f = y^3\vec{i} - z^2\vec{j} + 2x^2\vec{k}$ at (1,1,1)
17. Show that for any vector function F, div curl F = 0

PART-C

Answer any five questions. Each question carries 4 marks (5×4=20)

18. Find $J\left(\frac{u,v,w}{x,y,z}\right)$ if $u = \frac{x}{y-z}$, $v = \frac{y}{z-x}$ and $w = \frac{z}{x-y}$
19. Find the maximum and minimum value of $f(x,y) = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$
20. Solve $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$
21. Solve $\frac{dy}{dx} + 2xy = x^3$
22. Solve $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = x^2 \log x$
23. Prove that $J_{-n}(x) = (-1)^n J_n(x)$ where n is a positive integer
24. Use Green's theorem to evaluate $\oint x^2y\,dx + y^3\,dy$ where C is the closed path formed by $y = x$ & $y = x^3$ from (0,0) to (1,1)

PART-D

Answer any one question. Each carries 10 marks (1×10=10)

25. Verify Stoke's theorem for $f = (2x-y)\vec{i} - yz^2\vec{j} - y^2z\vec{k}$ where S is the upper half of the sphere $x^2 + y^2 + z^2 = 1$ & C is its boundary.
26. Solve by the method of variation of parameters $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 5y = \frac{e^{2x}}{\sin x}$