Reg.No :

D.K.M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE – 1

SEMESTER EXAMINATIONS

APRIL – 2016 **CAMA2A / CAMA4A**

ALLIED : MATHEMATICS - II

Time: 3 Hrs **Max. Marks: 75**

SECTION – A (10 X 2 =20)

Answer ALL the questions.

1. Evaluate : $\int_0^{\frac{\pi}{2}} sin^7 xdx$.
2. Evaluate : $\int x^3 \cos xdx$.
3. Evaluate : $\int_0^1 \int_0^2 xy^2\, dydx$.
4. Define the Fourier series of f (x).
5. Eliminate the arbitrary constants a and b from $z = (x-a)^2 + (y-b)^2$ +1.
6. Solve : $pq = 1$.
7. Find $L\,(sin^2 2t)$.
8. Find $L^{-1}\left(\frac{1}{(s+a)^2}\right)$
9. If $\emptyset\,(x,y,z) = x^2\, y - 2y^2 z^3$ find $\nabla\emptyset$, at the point (1,-1,2).
10. State Green's theorem in the plane.

SECTION – B (5 X 5 =25)

Answer any FIVE of the following questions.

11. Show that $\int_0^{\frac{\pi}{4}} \log(1 + tanx)dx = \frac{\pi}{8}\, log2$.
12. Find the mass centre of the first quadrant area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1$, using double integral.
13. Express $f(x) = \frac{x}{2}\,(-\pi < x < \pi)$ as a Fourier series and hence deduce that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots\ldots$
14. Solve : $p^2 + q^2 = x + y$.
15. Solve : $z^2(p^2 + q^2 + 1) = 1$.
16. Evaluate:$L^{-1}\left(\frac{s+2}{(s^2+4s+5)^2}\right)$.
17. Find the directional derivative of $xy + y^2 - z^2$ in the direction of the vector $3\vec{i} - 2\vec{j} + \vec{k}$ at (1,2,1).
18. If $\vec{F} = 3xy\vec{i} - y^3\vec{j}$,compute $\int_c \vec{F}\, d\vec{r}$ along $y = 2x^2$ from (0,0) to (1,2).

SECTION – C (3 X 10 =30)

Answer ALL the questions.

19. a) If $I_{m,n} = \int_0^{\pi/2} cos^m\, xcosnxdx$ prove that $I_{m,n} = \frac{m}{m+1} I_{m-1,n-1}$ Hence prove that $I_{m,n} = \frac{\pi}{2^{m+1}}$

(Or)

b) Find the volume common to the cylinders $x^2 + y^2 = a^2, x^2 + z^2 = a^2$.

20. a) Determine the Fourier series expansion of the function $f(x) = xsinx$ in the interval (0, 2π)

(Or)

b) Solve: $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$.

21. a) Using Laplace transform, Solve $\frac{d^2y}{dt^2} + 6\frac{dy}{dt} + 5y = e^{-2t}$, given that y = 0,$\frac{dy}{dt} = 1, when\ t = 0$.

(Or)

b) Verify Gauss Divergence theorem for $\vec{F}$ =4 $xz\vec{i} - y^2\vec{j} + yz\vec{k}$ taken over the cube bounded by $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.

* * * * * * *