Reg.No. | | | | | | | | | | | |

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

SEMESTER EXAMINATIONS

APRIL – 2016 **15CAMA2A**

ALLIED: MATHEMATICS – II

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

SECTION-A (10 x 2 = 20)

Answer ALL questions.

1. *Evaluate* $\int xe^x\,dx$.
2. *Prove that* $\int_0^a f(x)dx = \int_0^a f(a-x)dx$.
3. *Evaluate* $\int_0^1 \int_0^2 (x^2+y^2)dydx$.
4. *If* $f(x) = \left(\frac{\pi - x}{2}\right)^2; 0 \le x \le 2\pi$ *then find* a_0.
5. *Solve* $x^2p + y^2q = z^2$.
6. *Eliminate the arbitrary constant from* $z = ax + by + a^2 + b^2$.
7. *Find* $L\{e^{-2t}sin2t\}$.
8. *Find* $L^{-1}\left[\frac{10}{(s+2)^6}\right]$.
9. *If* $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$ *and* $r = |\vec{r}|$ *prove that* $\nabla r = \frac{1}{r}\vec{r}$.
10. *Show that* $grad(\vec{r}.\vec{a}) = \vec{a}$.

SECTION-B (5 x 5 = 25)

Answer any FIVE of the following questions.

11. *Evaluate* $\int_0^{2\pi} \frac{\sqrt{sinx}}{\sqrt{\sin x + \sqrt{\cos x}}}dx$.
12. *Evaluate* $\int_0^1 x(1-x)^{10}dx$.
13. *Evaluate* $\int_2^4 \int_0^x \int_0^{\sqrt{x+y}} zdzdydx$.
14. *Solve* $\sqrt{p} + \sqrt{q} = 1$.

15. *Find* $L^{-1}\left(\frac{s+2}{(s-2)^7}\right)$.

16. *Prove that* $div\left(\frac{\vec{r}}{r}\right) = \frac{2}{r}$.

17. *Find a Fourier expansion for* $f(x) = -\pi$ *when* $-\pi < x < 0$.

$= x$ *when* $0 < x < \pi$.

18. *Solve* $(y-z)p + (z-x)q = x - y$.

SECTION-C (3 x 10 = 30)

Answer ALL questions.

19. *(a) Evaluate* $\int_0^{\frac{\pi}{4}} log(1+tan\phi)\, d\phi$.

(Or)

(b) Find the Reduction formula for $\int_0^{\frac{\pi}{2}} sin^n x dx$.

20. *(a) Obtain a Fourier expansion for the function*

$$f(x) = {}^1/_2\,(\pi - x), 0 < x < 2\pi.$$

(Or)

(b) Solve $z = p^2 + q^2$ *find complete and singular solutions.*

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) Evaluate $\iiint_v \nabla.\vec{F} dv$ *if* $\vec{F} = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$ *and if V is the volume of the region enclosed by the cube*

$$0 \le x \le 1, 0 \le y \le 1, 0 \le z \le 1.$$

* * * * * *