



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

U.G DEGREE EXAMINATION – **PHY.,CHEM.,STAT.,COMP.SCI.& COMP.APP.**

THIRD SEMESTER – NOVEMBER 2017

MT 3206- APPLIED MATHEMATICS

Date: 15-11-2017
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

SECTION A

ANSWER ALL QUESTIONS

(10 X 2 = 20)

1. If the revenue function is $R'(x) = 12 - 8x + x^2$, determine the total revenue and demand function.
2. Integrate $3x^2 + 2x + 6$ with respect to x .
3. If $\vec{F} = t^3\vec{i} + t^2\vec{j} + (3t + 1)\vec{k}$ find $\frac{d^2\vec{F}}{dt^2}$.
4. Show that $\vec{F} = z\vec{i} + x\vec{j} + y\vec{k}$ is solenoidal.
5. Find the differential equation of all spheres of radius 5 having their centres in the xy -plane.
6. Determine the order of $t^2 \frac{d^2s}{dt^2} - st \frac{ds}{dt} = s$.
7. Define linear programming.
8. Find $L[\sin 2t]$.
9. Find the value of $L^{-1}\left(\frac{1}{s+4}\right)$.
10. Define Spearman's rank correlation coefficient.

SECTION B

ANSWER ANY FIVE QUESTIONS

(5 X 8 = 40)

11. The quantity demanded and price under pure competition are determined by the demand and supply function $y = 36 - x^2$ and $y = 6 + \frac{x^2}{4}$ respectively. Determine producer surplus.
12. Find the values of a, b, c so that the vector $\vec{F} = (x + 2y + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + cy + 2z)\vec{k}$ is irrotational.
13. Evaluate $\iint e^{\frac{y}{x}} dx dy$ over the region bounded by the straight lines $y = x$, $y = 0$ and $x = 1$.
14. Evaluate $\int_0^{\infty} e^{-2t} \sin 3t dt$.
15. Find the Laplace transform of the following function $f(t) = \begin{cases} t, & 0 < t < 1 \\ 0, & 1 < t < 2 \end{cases}$
16. Find $L^{-1}\left[\frac{1}{(s+1)(s+3)}\right]$.
17. Determine the maximum and minimum of a function $f(x, y, z) = xy + 10x - x^2 - y^2 - z^2$.
18. From the following data calculate the coefficient of correlation.

X	1	2	3	4	5
Y	10	20	30	50	40

SECTION C

ANSWER ANY **TWO** QUESTIONS

(2 X 20 = 40)

19. (a) The quantity sold and the corresponding price, under monopoly is determined by the demand function $y = 16 - x^2$ and the marginal cost function $y' = 6 + x$ in such a way as to maximize the profit. Determine the corresponding consumer surplus.

(b) Evaluate $\int_0^a \int_0^{\sqrt{a^2 - x^2}} dx dy$. (12 + 8)

20. (a) Evaluate $\iint_S \vec{F} \cdot \vec{n} ds$ where $\vec{F} = z\vec{i} + x\vec{j} - y^2z\vec{k}$ and S is the surface of the cylinder

$x^2 + y^2 = 1$ Included in the first octant between the planes $z = 0$ and $z = 2$.

(b) Show that the vector $3x^2y\vec{i} - 4xy^2\vec{j} + 2xyz\vec{k}$ is solenoidal. (15 + 5)

21. (a) Solve $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} - 5y = 5$ given that $y(0) = 2$, $y'(0) = 2$ when $t = 0$.

(b) In a culture of east, the amount A of active yeast grows at a rate proportional to the amount present. If the original amount A_0 doubles in 2 hours, how long does it for the original amount to trip? (12 + 8)

22. Calculate the mean, standard deviation, coefficient of variation and variance for the following data:

(20)

Roll. No	5	15	25	35	45	55
Marks	10	20	30	50	40	30

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