LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc.** DEGREE EXAMINATION – **PHYSICS**

THIRD SEMESTER – **APRIL 2012**

# MT 3102/3100 - MATHEMATICS FOR PHYSICS

Date : 28-04-2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

**Section A**

**Answer ALL questions: (10 × 2 = 20)**

1. Find the *n*th derivative of *e*4*x*.
2. Show that in the curve *rθ* = *a*, the polar sub tangent is constant.
3. Expand in ascending powers of *x*, ‘*a*’ being positive.
4. Define a symmetric matrix and give an example.
5. Find the Laplace transform of *t*2 + 2*t* + 3.
6. Find .
7. Prove that .
8. Write down the expansion of and in a series of ascending powers of .
9. Two dice are thrown. What is the probability that the sum of the numbers is greater than 8?
10. Write a short note on binomial distribution.

**Section B**

**Answer any FIVE questions: (5 × 8 = 40)**

1. Find the *n*th differential coefficient of *sinx sin*2*x sin*3*x*.
2. Find the angle of intersection of curve*srn* *=ancosnθ* an*drn* *=an sinnθ*.
3. Show that .
4. Show that the matrix is orthogonal.
5. Find the Laplace transform of
6. Separate into real and imaginary parts of .
7. Prove that .
8. Calculate the mean and standard deviation for the following frequency distribution:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Class Interval** | **0 - 8** | **8 - 16** | **16 - 24** | **24 – 32** | **32 - 40** | **40 - 48** |
| **Frequency** | **8** | **7** | **16** | **24** | **15** | **7** |

**Section C**

**Answer any TWO questions: (2 × 20 = 40)**

19. a) If *y* = *acos*(*logx*) + *bsin*(*logx*), prove that *x*2*yn* + 2 + (2*n* + 1)*xyn* + 1 + (*n*2 + 1)*yn* = 0.

b) Find the sum to infinity of the series .

(12 + 8)

20.a) Find the characteristic roots of the matrix .

b) Verify Cayley Hamilton Theorem for matrix and also find . (6 + 14)

21. a) Find .

b) Solve the equation given that when *t* = 0.

(5 + 15)

22. a) If prove that .

b) Express in a series of sines of multiples of θ.

c) A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which (i) neither car is used, and (ii) the proportion of days on which some demand is refused. (8+5+7)

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