Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University) Coimbatore – 641 043

Master's Degree Examination - November-2018
Semester – I

Class : I PG
Major : Physics

Time: 3 hours
Max. Marks: 60

17MPHC01 Mathematical Physics-I

Part A **(10 x 1/2 = 5)**

Choose the correct answer

1. If A is a matrix then AA^{-1} =

   a. 1 b. 0 c.10 d.2

2. According to Cayley Hamilton theorem determination of $(A- \lambda I)$ is =

   a.0 b.1 c. 100 d.I

3. Del operator will convert

   a. scalar function to vector quantity b. vector function to scalar
   c. vector to integral quantity d. vector function to tensor

4. A scalar is a tensor of rank

   a. 0 b.1 c. infinity d. 4

5. If the condition $\partial u/\partial x=\partial v/\partial y$ is satisfied, then the equations are called as

   a. Cauchy Riemann b. Cayley Hamilton

   c. residual d. complementary

6. Taylor series is called as Maclaurin series only if z_0=

   a. 0 b. 1 c.4 d. 25

7. Probability of success+probability of failure is equal to

   a. 1 b.0 c.6 d.10

8. n-np=

   a. nq b. qp c.1 d.2

9. A group consists of

   a. finite number of elements b. infinite number of elements
   c.value1 d. value 0

10. Two dimensional representation of matrices C_4 is

    a. reducible b. irreducible c. both d. unity

Part B (5 x 4 = 20)

Answer ALL questions

Each answer should not exceed 200 words or one page

11a. Obtain the transpose conjugate of a matrix.

(OR)

11b. State and explain Cramer's rule.

12a. Discuss about Dirac delta function.

(OR)

12b. List the properties of del and Laplacian operator.

13a. Compare and contrast Kronecker and Levi - Civita tensor.

(OR)

13b. Distinguish between non essential and essential singularities.

14a. State and explain elementary probability theory.

(OR)

14b. State and prove Central limit theorem

15a. Define and explain about homomorphism and isomorphisim.

(OR)

15b. Discuss about D_2 and D_3 group.

Part C (5 x 7 = 35)

Answer ALL questions

Each answer should not exceed 600 words or three pages

16a. State and prove Cayley Hamilton theorem.

(OR)

16b. Find eigen values and eigen vectors of the matrix.

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$$

17a. Discuss about outer product and contraction and quotient theorem.

(OR)

17b. Elaborate the algebra of Cartesian tensors.

18a. Find the value of $\int z^2+1/z^2-1\ dz$ over the circle of unit radius with centre at z=1

(OR)

18b. Find the first three terms of Taylor series expansion of $f(z)=1/z^2+4$ about z=-i. Also find the region of convergence

19a. The following data are the number of seeds germinating out of 10 on damp filter for 80 sets of seeds. Fit a binomial distribution to these data.

x	0	1	2	3	4	5	6	7	8	9	10
f	6	20	23	12	8	6	0	0	0	0	0

(OR)

19b. A box contains one pink and seven red pens .A pen is drawn from the box and after noting its colour ,is put back into the box. Then the contents of the box are thoroughly mixed. Using Poisson approximation ,determine the probability that such drawings a pink pen is selected exactly three times

20a. Compare and contrast continuous and Lie groups.

(OR)

20b. Discuss about SU_3 and SU_N groups.

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