

Master's Degree Examination – November 2017

1 Semester

**Class : I PG
Major : Physics**

**Time: 3 hours
Max. Marks: 60**

17MPHC01 Mathematical Physics-I

Choose the Correct Answer

PART A

10X1/2=5

1. Largest of any non vanishing minor of matrix is called
a. rank b. inverse c. square d. null
2. $A^+A=$
a. I b. 0 c. infinite d. A
3. Laplacian operator is
a. del b. square of del c. cube of del d. delta
4. Del of r^1 equals
a. 1 b. 0 c. 2 d. 3
5. The analytic function $f(Z)$ whose real part x^2-y^2 is
a. Z b. Z^2 c. mod Z d. Z^0
6. Cauchy Riemann equations are
a. $\partial u/\partial x = \partial v/\partial y$ and $\partial v/\partial x = -\partial u/\partial y$ b. $\partial u/\partial v = 34$ c. $\partial u/\partial x = \partial r/\partial s$ d. $\partial u + \partial v$
7. A problem of physics is given to 3 students A, B & C whose chances of solving are $1/2, 1/3, 1/4$ respectively. The probability that the problem will be solved is
a. $1/4$ b. $1/2$ c. $1/24$ d. $1/8$
8. Mean of binomial distribution is
a. $p+q$ b. np c. npq d. \sqrt{n}
9. A group is a set of --- elements
a. finite b. infinite c. 70 d. zero
10. A set of elements of a group, which itself forms a group is called
a. subgroup b. abelian c. cyclic d. product

PART B

Answer ALL questions

5 x 4 = 20

Each answer should not exceed 200 words or one page

- 11a. Compare orthogonal and unitary matrices (OR)
- 11b. Explain the method of finding inverse of the matrix
- 12a. Discuss about covariant and contravariant vectors (OR)
- 12b. What is meant by Dirac delta function? List the properties
- 13a. State and prove Cauchy's integral theorem (OR)
- 13b. Find the poles and residues at the poles of $Z/\cos Z$
- 14a. State and prove Binomial theorem of probability (OR)
- 14b. State and prove central limit theorem
- 15a. Compare orthogonal and unitary group (OR)
- 15b. Discuss about homogeneous Lorentz group

Part C

Answer ALL questions

5 x 7 = 35

Each answer should not exceed 600 words or three pages

- 16a. How will you diagonalise the matrix? (OR)
- 16b. State and prove Cayley Hamilton theorem
- 17a. State and prove contraction and quotient theorems (OR)
- 17b. Explain about Kronecker and Levi Civita tensors
- 18a. State and prove Cauchy's residue theorem (OR)
- 18b. Discuss in detail about Taylor's series. Find the first two terms of Taylor series expansion of $f(Z) = 1/Z^2 + 4$
- 19a. The following data are the number of seeds germinating out of 10 on damp filter for 80 sets of seed. Fit a Binomial distribution
- | | | | | | | | | | | | |
|---|---|----|----|----|---|---|---|---|---|---|----|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Y | 6 | 20 | 23 | 12 | 8 | 6 | 0 | 0 | 0 | 0 | 0 |
- (OR)
- 19b. Discuss about Normal distribution
- 20a. Write short notes on continuous and Lie groups
- (OR)
- 20b. Explain about $SU(2)$ $SU(3)$ $SU(n)$ groups