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B. Sc. (Hons.) Physics 4th Semester
Examination – May, 2019

MATHEMATICS- IV

Paper : Phy-405

Time : Three hours]   *[Maximum Marks : 40*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after examination.

Note : Attempt *five* questions in all, selecting at least *two* questions from each Unit. Use of Scientific (non-programmable) calculator is allowed.

UNIT – I

1. (a) Suppose that x has a Poisson distribution. If $P(x = 2) = \frac{2}{3} P(x = 1)$, then find :   4

   (i) $P(x = 0)$

   (ii) $P(x = 3)$

   (b) Describe the probability model from which the Binomial distribution can be generated. Hence find the first four central moments.   4

2. (a) Find the mode and median of normal distribution.   4

   (b) 2000 student appeared in an examination. Distribution of marks is assumed to be normal with mean 30 and standard deviation 62.5. How many students are expected to get marks between 20 and 40.   4

3. (a) Define geometric distribution. Find its moment generating function.   4

   (b) A two dimensional random variable (X, Y) have bivariate distribution given by $P(x = x, x = y) = \frac{x^2 + y}{32}$ for $x = 0, 1, 2, 3$ and $y = 0, 1$ Find the marginal distribution of X and Y.   4

4. (a) The lines of regression of a bivariate population are :   4

   $12x - 15y + 99 = 0$; $64x - 27y = 373$. The variance of X is 9. Find :

   (i) The mean value of X and Y.

   (ii) $r(X, Y)$.

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(b) Find the correlation coefficient for the f
data :

X	65	66	67	67	68	69	70
Y	67	68	65	68	72	72	69

UNIT – II

5. (a) Describe the Chi - square test of significanc
state the various uses to which it can be put.

(b) Ten soldiers visit a rifle range for two consec
week. For the first week their scores are :

67, 24, 57, 50, 63, 54, 56, 68, 33, 43 and du
the second week they score in the some order.

70, 38, 58, 58, 56, 67, 68, 72, 42, 38.

Examine if there is any significance differer
in their performance.

6. (a) What are application of t- distribution ?

(b) What is meant by sampling error ? Explain Prov
that standard error of sample mean is $\frac{\sigma}{\sqrt{n}}$.

7. (a) Write a note on student's t-distribution and poin
out its uses. 4

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(b) The manufactures of a certain make of electric
bulbs claims that his bulbs have a mean life of 25
months with a standard deviation of 5 month. A
random sample of 6 such bulbs gave the following
values :

Life in months : 24, 26, 30, 20, 20, 18

Can you regard the producer's claim to be valid at
1% level of significance ? (Given that the table
values of the appropriate test statistics at the said
level are 4.032, 3.707 and 3.499 for 5,6 and 7
degrees of freedom respectively. 4

8. (a) What is meant by sampling distribution and
standard error ? Explain write standard error of
mean. 4

(b) Two random samples gave the following
results : 4

Sample	Size	Sample mean	Sum of square of deviations from mean
1	10	15	90
2	12	14	108

Test whether the sample come from the same normal
population at 5% level of significance.

(4)