B. PHARMACY 1ST YEAR 1ST SEMESTER SUPPLEMENTARY EXAMINATION 2017.

Subject: Mathematics.
Paper- 1 M.

Full Marks: 100 **Time: THREE HOURS.**

USE SEPARATE ANSWERSCRIPTS FOR DIFFERENT GROUPS.

GROUP A

ATTEMPT ANY FIVE QUESTIONS. Each question carries 10 marks.

1. Find the Mean and Variance of the following dataset:
   4.21, 5.00, 5.12, 4.57, 5.08, 5.28, 5.67, 4.28, 4.89, 4.55, 5.27, 4.91, 5.11, 4.78.

2. Find the correlation coefficient of X and Y :

X:	0	1	2	3	4	6
Y:	2	3	5	4	6	8

3. Find the probability of getting 6 HEADS in 10 random tosses of a fair coin.
4. From the digits 5, 6, 9, 7 and 1, one digit is selected at random and then, again another digit is chosen. Write down the sample space and assume that each point there is equally probable. What is the probability that (i) both the digits chosen are odd; and (ii) the sum of the selected two digits are even.
5. In how many ways, can you put 5 distinct balls (viz. ball no. 1, 2, 3, 4 and 5) into 3 distinct urns: urn A, urn B and urn C? Find the probability that the ball no. 1 always goes into urn A.
6. A committee of FIVE is to be selected from a group of 6 Men and 7 Women. If selection is made at random, find the probability that the final committee comprises 3 Women and 2 Men.

GROUP B

ATTEMPT ANY FIVE QUESTIONS. Each question carries 10 marks

1. a) If A, B are commuting matrix, prove that A^T, B^T commute. Prove that $AB - BA = I_2$ cannot hold, where I_2 is identity matrix of order 2.

   b) If

$$A = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{bmatrix}, \text{ show that } A^{-1} = A^3.$$

2. a) Find the rank of the following matrix:

$$\begin{bmatrix} 1 & 0 & 3 \\ 4 & -1 & 5 \\ 2 & 0 & 6 \end{bmatrix}.$$

b) P is an real orthogonal matrix of order n $with$ det $P = -1$. Prove that $P + I_n$ is a singular matrix.

3. a) Determine the condition for which the following system

$$x + y + z = 1$$

$$x + 2y - z = b$$

$$5x + 7y + az = b^2$$

admits i) one solution, ii) no solution, iii) many solutions.

4. a) Solve the following system using Cramer's rule

$$x + y + z = 6,$$

$$x + 2y + 3z = 14,$$

$$x - y + z = 2.$$

b) Prove that a skew symmetric determinant of odd order is zero.

5. a) State and prove Lagrange's mean value theorem.

b) If $y = x^{n-1}\log x$, prove that $y_n = \frac{(n-1)!}{x}$, where y_n is the $n-th$ derivative of y.

6. a) Define Gamma function and Beta function.

b) Solve $(1 + y^2)dx = (\tan^{-1} y - x)dy$.

7. a) Solve $(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$.

b) Solve $(x^2 + y^2)dx - 2xydy = 0$.

8. a) Solve the differential equation $(D^2 - 3D + 2)y = e^x, where\ D = dy/dx$.

b) Evaluate $\lim_{x\to 0} \frac{e^x - e^{-x} - 2\log(1+x)}{x \sin x}$ using L'Hospital's rule.