(b) Define uniform distribution. If X_1 and X_2 are independent rectangular variates on [0, 1], find the distribution of :

(i) X_1/X_2

(ii) $X_1.X_2$.

6. (a) Six dice are thrown 729 times. How many times do you expect at least three dice to show as five or six ?

(b) Derive normal distribution as a limiting case of binomial distribution.

Unit IV

7. (a) Discuss some important properties of regression coefficients.

(b) State and prove central limit theorem.

8. (a) Explain Chi-square test of goodness of fit.

(b) Define Student's *t*-distribution and discuss its applications.

No. of Printed Pages : 04 **Roll No. ....**

BB-313

M. Sc. EXAMINATION, Dec. 2017

(Second Semester)

(Re-appear Only)

MATHEMATICS

MAT-506-B

Methods of Applied Mathematics

Time : 3 *Hours*] [*Maximum Marks :* 100

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

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Find the Fourier cosine transform of the function :

$$f(z) = \begin{cases} \cos x & , \quad 0 < x < 1 \\ 0 & , \quad \text{otherwise} \end{cases}$$

(b) State and prove Parseval'is identity.

2. Solve by the use of Fourier transform :

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0, -\infty < x < \infty, y > 0$$

with $u(x, 0) = f(x), -\infty < x < \infty$, u is bounded as $y \to \infty$, u and $\frac{\partial u}{\partial x}$ both vanish as $|x| \to \infty$.

Unit II

3. (a) Show that if u, v, w are orthogonal curvilinear coordinates, then $\frac{\partial \overline{r}}{\partial u}, \frac{\partial \overline{r}}{\partial v}, \frac{\partial \overline{r}}{\partial w}$ and ∇u, ∇v, ∇w are reciprocal system of vectors.

(b) Express the vector $xi + 2yj + yzk$ in spherical coordinates.

4. Obtain the expression for the curl of a vector point function in orthogonal curvilinear coordinates and deduce the expression in cylinderical and spherical coordinates.

Unit III

5. (a) A random variable X has the following probabiltiy function value of X,

x	$p(x)$
0	0
1	k
2	$2k$
3	$2k$
4	$3k$
5	k^2
6	$2k^2$
7	$k + 7k^2$

(i) Find k

(ii) Evaluate P(X $<$ 6), P(X $\geq$ 6), P(3$<$ X $\leq$ 6).