[LH 0415] **OCTOBER 2015** **Sub. Code: 4012**

M.Sc., MEDICAL PHYSICS DEGREE EXAMINATION
(Revised Regulations for Candidates admitted from 2010-2011 Batch onwards)
FIRST YEAR
PAPER II – RADIOLOGICAL MATHEMATICS

Q.P. Code : 284012

Time : Three hours **Maximum : 100 marks**

I. Elaborate on : **(2 x 20 = 40)**

1. (a) Describe the following concepts (i) geometric mean (ii) standard deviation (iii) root mean square deviation (iv) Properties of the t-test.

   (b) Use the binomial series to determine the expansion of $(2 + x)^7$.

2. (a) If 3% of the gearwheels produced by a company are defective, determine the probabilities that in a sample of 80 gearwheels (i) two and (ii) more than two will be defective. (use Poisson approximation to a binomial distribution)

   (b) Explain linear correlation and the significance of a co-efficient of correlation.

II. Write notes on: **(10 x 6 = 60)**

1. Relative error and Round-off error.
2. Use integration to evaluate, correct to 3 decimal places, $\int_1^3 \frac{2}{\sqrt{x}}\,dx$. Use the trapezoidal rule with 4 intervals to evaluate the integral in part (a), correct to 3 decimal places.
3. Determine the standard deviation from the mean of the set of numbers: {5, 6, 8, 4, 10,3} correct to 4 significant figures.
4. Skewness and kurtosis.
5. Write a short note about (a) efficiency (b) sensitivity (c) signal-to-noise-ratio
6. Linear and non-linear graphs.
7. The experimental values relating centripetal force and radius, for a mass travelling at constant velocity in a circle, are as shown:
8. Force (N) 5 10 15 20 25 30 35 40
   Radius (cm) 55 30 16 12 11 9 7 5
9. Determine the equations of (a) the regression line of force on radius.
10. Prepare a daily decay chart for Ir-192 for 1 week after the 1st half life. (Initial activity = 10 Ci and $T^{1/2}$ = 74 days).

*****