

[LM 0518]

MAY 2018

Sub. Code: 4012

**M.Sc. MEDICAL PHYSICS EXAMS
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) Derive Newton-Raphson formula to find the actual root of an equation $f(x) = 0$.
b) Using Newton-Raphson iteration method show that the root of the equation $X \log_{10} X = 1.2$ is approximately 2.5.
2. a) Discuss correlation and regression.
b) Fit a regression line of Y on X and then predict Y if X = 10 from the bivariate data

X	1	5	3	2	1	1	7	3
Y	6	1	0	0	1	2	1	5

II. Write notes on:

(10 x 6 = 60)

1. In a computational work, the approximate value of 4 is determined as 4.00012. Find the error, absolute error, relative error and percentage error.
2. Define decay constant and prepare a decay chart and tabulate for Co-60 isotope for the period one half life.
3. Use Runge-Kutta method to find y for x = 0.2 for the differential equation $dy/dx = x + y^2$. Given $y(x=0) = 1$ and $h = 0.1$.
4. Discuss poisson distribution.
5. Find the variance and standard deviation for the following data:
57, 64, 43, 67, 49, 59, 44, 47, 61, 59
6. Given $dy/dx = 1 + xy$, $f(0) = 1$. Obtain Taylor series for $f(x)$ and compute $f(0.1)$. Correct it to 4 decimal places.
7. Evaluate the integral of $\int_{-3}^3 x^4 \cdot dx$ by 6 intervals using Simpson's 3/8 rule.
8. Explain data collection and its graphical representation.
9. The values of capacitances in μF of ten capacitors selected at random from a large batch of similar capacitors are: 34.3, 25.0, 30.4, 34.6, 29.6, 28.7, 33.4, 32.7, 29.0 and 31.3. Determine the standard deviation from the mean for these capacitors.
10. State the properties and applications of Chi-squared distribution.
