

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION**FIRST YEAR****(Revised Regulations for Candidates admitted from 2010-2011)****PAPER II – RADIOLOGICAL MATHEMATICS****Q.P. Code: 284012****Time : Three Hours****Maximum : 100 marks****Answer ALL questions****I. Elaborate on:****(2 x 20 = 40)**

- Describe the following concepts:
 - accuracy and precision.
 - round-off-error.
 - addition and multiplication law of probability.
 - Confidence intervals
- Evaluate $\int_0^1 dx/1+x^2$ using Simpson's three-eighth rule & compare with the solution
 - Explain about five properties of Chi-square distribution

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

- Calculate the decay constant for cobalt-60 ($T_{1/2}=5.26\text{yrs}$) in units of month^{-1}
- What will be the activity of 5000 Ci of cobalt-60 source after 4 years?
($A=A_0 e^{-\lambda t}$)
- A treatment regimen with total dose of 20Gy must be given in two phases.
The ratio of the dose in each phase is 3:1. What dose must be given for each phase?
- In a certain residential area, a sample of 15 households showed the following incomes (in rupees) for the households:

1044	796	812	2100	902	600	796	
672	482	1828	2358	939	550	796	325

Find out the mean, median and the mode for the sample.

- Explain about (a) Skewness (b) Kurtosis in detail.
- Use the Taylor series method of order four to solve the initial value problem
 $u' = t^2 + u^2, u(0) = 1$

7. The two regression equations of X on Y and Y on X are given below:

$$Y = 100.26 + 0.77 X; X = 1.28 Y - 143.7.$$

Find out the means of X and Y.

8. Write a short note about (a) efficiency (b) sensitivity (c) signal-to-noise-ratio.

9. Assuming the each child as probability 0.51 of being a boy, find the probability distribution of number of boys in a family of 4 children. In a sample of 500 couples how many do you expect to have.

(i) Exactly 1 boy.

(ii) Exactly 1 girl.

(iii) At least one boy?

10. Write a function to draw a circle of unit radius using MATLAB function.

For generating data, use the parametric equation of a unit circle; $X = \cos\theta$,

$Y = \sin\theta$, $0 \leq \theta \leq 2\pi$.

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION**FIRST YEAR****(Revised Regulations for Candidates admitted from 2010-2011)****PAPER II – RADIOLOGICAL MATHEMATICS****Q.P. Code: 284012****Time : Three Hours****Maximum : 100 marks****Answer ALL questions in the same order.****I. Elaborate on:**

Pages (Max.)	Time (Max.)	Marks (Max.)
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- | | | | |
|---|----|---------|----|
| 1. a) Height of father and son are given in centimeters | 17 | 40 min. | 20 |
|---|----|---------|----|

Height of Father	150	152	155	157	160	161	164	166
Height of Son	154	156	158	159	160	162	161	164

Find the two regression lines

- b) A random variable
- x
- has the following probability function

X	0	1	2	3	4	5	6	7	8
P(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

Find the (i) the value of 'a', (ii) mean and variance (x), (iii) $P(x \leq 3)$

- c) Find Pearson's coefficients of Skewness for the following data.

Class	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Frequency	5	9	14	20	25	15	8	4

2. a) If
- $X_1, X_2, X_3, \dots, X_n$
- are Poisson variable with parameters
- $\lambda = 2$

Use the central limit theorem to estimate $P(180 < S_n < 200)$ where $S_n = X_1 + X_2 + X_3 + \dots + X_n$ and $n = 90$

- b) compute
- $y(0.3)$
- given
- $dy/dx = 1 - 2xy$
- with
- $y(0) = 0$
- , taking
- $h = 0.1$
- .

Using Taylor's series method

- c) A curve passing through the points
- 17 40 min. 20

x	1	1.5	2.0	2.5	3.0	3.5	4.0
y	2	2.4	2.7	2.8	3.0	2.6	2.1

- i) Obtain the area bounded by curve the axis between
- $x = 1$
- to
- $x = 4$

- ii) Find the volume of solid of revolution got by revolving the area about x-axis.

(PTO)

II. Write notes on :**Pages Time Marks**
(Max.) (Max.) (Max.)

1. Find $y(0.1)$, $y(0.2)$ given by $dy/dx = x - 2y$ with $y(0) = 1$ taking $h = 0.1$ by Euler's, Modified Euler's method, Improved Euler's method

4 10 min. 6

2. Weekly wages of 1000 workman are normally distributed around a mean of Rs. 70 with standard deviation of Rs.5. Estimate the numbers of workers whose weekly wages will be
- (i) Between Rs. 69 and Rs.72
- (ii) Less than 69
- (iii) More than 72

4 10 min. 6

3. Calculate the mean and standard deviation from the following table giving the age distribution of 542 members.

4 10 min. 6

Age	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of members	3	61	132	153	140	51	2

4. From the following data calculate the rank correlation coefficient after making adjustments for tied ranks

4 10 min. 6

X	48	33	40	9	16	16	65	24	16	57
Y	13	13	24	6	15	4	20	9	6	19

5. Define frequency, mean, median and mode.

4 10 min. 6

6. Find a root of $x \log_{10} x - 1.2 = 0$ by N-R method to three decimal places.

4 10 min. 6

7. Define decay constant and prepare a decay chart and tabulate for Co-60 isotope for one half life.

4 10 min. 6

8. Define line symmetry, mirror symmetry and standard deviation.

4 10 min. 6

9. The chances of winning of two race horses are $1/3$ and $1/6$ respectively. What is the probability that at least one will win when the horses are running

(i) In different races.

4 10 min. 6

(ii) In the same race.

10. Evaluate the integral $I = 4 \int_5^{12} \log x \, dx$ using trapezoidal, Simpson 1/3 rule and Weddler rule.

4 10 min. 6

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION**FIRST YEAR****(Revised Regulations for Candidates admitted from 2010-2011)****PAPER II – RADIOLOGICAL MATHEMATICS****Q.P. Code: 284012****Time : Three Hours****Maximum : 100 marks****Answer ALL questions in the same order.****I. Elaborate on:****Pages Time Marks
(Max.) (Max.) (Max.)**

1. a) Calculate Karl Pearson correlation coefficient for the following

Data: (15 + 5 =20 marks)

Age	30	32	35	38	42	44	45	51	55	65
Blood urea	25	30	44	34	38	32	30	44	40	45

- b) Discuss the assumptions of Karl Pearson correlation method?

2. a) A bag contains 10 Aspirin, 5 Paracetamol, 3 Analgin and 2 Crocin tablets. One tablet is drawn at random. Find the probability that the tablet drawn is Aspirin or Analgin or Crocin.

- b) Discuss continuous probability distributions and discrete probability distributions. (10 +10 =20 marks)

II. Write notes on:

- | | | | |
|---|---|---------|---|
| 1. Discuss measures of central tendency. | 4 | 10 min. | 6 |
| 2. Prepare the decay chart for cobalt-60 teletherapy isotope for the period of one half- life. | 4 | 10 min. | 6 |
| 3. Define: (i) law of large numbers (ii) Central limit theorem. | 4 | 10 min. | 6 |
| 4. A manufacturer of television sets knows that of an average 5% of his product is defective. He sales television in consignment of 100 and guarantees that not more than 4 sets will be defective. What is the probability that a television set will fail to meet the guaranteed quality? | 4 | 10 min. | 6 |

5. Calculate Mean, standard deviation for the following

10 Diastolic blood pressure data:

4 10 min. 6

90	100	88	102	70	66	78	82	84	86
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6. What are the properties of t-distribution?

4 10 min. 6

7. Define: (i) Minimum detectable activity

(ii) uncertainty in the counting rate.

4 10 min. 6

8. Discuss binomial distribution.

4 10 min. 6

9. Define signal to noise ratio.

4 10 min. 6

10. Discuss Euler's method and modified Euler's method.

4 10 min. 6

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION**FIRST YEAR****(Revised Regulations for Candidates admitted from 2010-2011)****PAPER II – RADIOLOGICAL MATHEMATICS****Q.P. Code: 284012****Time : Three Hours****Maximum : 100 marks****Answer ALL questions in the same order.****I. Elaborate on:**

Pages (Max.)	Time (Max.)	Marks (Max.)
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1. a) Find is their significant difference between diabetic persons cholesterol value and non-diabetic persons cholesterol value. t-table value = 2.26. 17 40 min. 20

Diabetic group	160	162	165	186	185	175
Non diabetic group	144	148	140	140	152	141

- b) Discuss the conditions for applying student t-test.

2. a) A study revealed that among 90 males 15 were obese and among 60 females 20 were obese. Use chi square test to find whether sex and obesity are associated. 17 40 min. 20
($\chi^2=3.84$ at 5% level)

- b) Discuss precautions for applying chi square distribution.

II. Write Notes on :

- | | | | |
|--|---|---------|---|
| 1. Discuss Correlation and regression. | 4 | 10 min. | 6 |
| 2. Prepare the decay chart for cobalt-60 teletherapy isotope for the period of one half- life. | 4 | 10 min. | 6 |
| 3. Discuss Euler's method and modified Euler's method. | 4 | 10 min. | 6 |
| 4. Discuss linear graphs and nonlinear graphs. | 4 | 10 min. | 6 |
| 5. Discuss Ranga-kutta method. | 4 | 10 min. | 6 |
| 6. What are the properties of F-distribution. | 4 | 10 min. | 6 |
| 7. Define: (i) Minimum detectable activity
(ii) uncertainty in the counting rate. | 4 | 10 min. | 6 |
| 8. Discuss F- distribution. | 4 | 10 min. | 6 |
| 9. Define signal to noise ratio. | 4 | 10 min. | 6 |
| 10. Out of 800 families with 4 children each, how many families would be expected to have.
(1) 2 boys and 2 girls. (2) no girl. | 4 | 10 min. | 6 |

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

Q.P. Code: 284012

Time : Three Hours**Maximum : 100 marks****Answer ALL questions****I. Elaborate on:****(2 x 20 = 40)**

1. a) Find the regression equation for the following data

Age	40	42	48	52	55	58	64	68	70	80
SBP	123	125	130	125	140	136	145	148	146	150

- b) What are the uses of regression analysis ?

2. a) Find the probability that at most 5 defective fuses will be found in a box of 200 fuses if experience shows that 2% of such fuses are defective given that $e^{-4} = 0.0183$.

- b) Discuss difference between Binomial and Poisson distribution .

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

- Discuss differences between standard deviation and standard error.
- Define vector and scalar quantity, give examples.
- Define ratio. Treatment was planned to deliver total dose of 60Gy in three course of time. The dose planned to deliver in the ratio of 3:2:1. Calculate the dose delivered in each course and percentage of dose delivery.
- Calculate Geometric mean and Harmonic mean for the following quantities:
8, 16, 48, 64.
- What are the properties of the t-test.
- Define: (i) Truncation error (ii) Round-off error (iii) Relative error.
- Discuss line symmetry and mirror symmetry.
- Calculate Mean, standard deviation for the following Diastolic blood pressure data:
93, 90, 95, 85, 90, 78.
- Evaluate $\int_{-3}^3 x^4 dx$ using (i) Trapezoidal rule (ii) Simpson's one-third rule.
- Discuss Simple random sampling.

[LD 1013]

OCTOBER 2013

Sub. Code: 4012

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

FIRST YEAR

(Revised Regulations for Candidates admitted from 2010-2011)

PAPER II – RADIOLOGICAL MATHEMATICS

Q.P. Code: 284012

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Discuss the assumptions of Karl Pearson correlation method?
2. Discuss on different types of distribution.

II. Write notes on:

(10 x 6 = 60)

1. Oscillations and Waves
2. Prepare the decay chart for Iridium-192 teletherapy isotope for the period of one half- life.
3. Presentation of Data.
4. Regression.
5. Statistical accuracy in double isotope.
6. Newton Raphson Method.
7. Testing of Hypothesis.
8. Probability Sampling.
9. MATLAB.
10. Confidence interval.

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION**FIRST YEAR****(Revised Regulations for Candidates admitted from 2010-2011)****PAPER II – RADIOLOGICAL MATHEMATICS****Q.P. Code: 284012****Time : Three Hours****Maximum : 100 marks****Answer ALL questions****I. Elaborate on:****(2 x 20 = 40)**

1. a) Find the Karl pearson correlation coefficient for the following data:

Age	40	45	48	50	55	50	54	58
SBP	120	125	130	125	140	146	154	160

- b) What are the differences between correlation and regression?

2. a) Discuss exponential distribution.

- b) Discuss difference between Binomial and Poisson distribution.

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

1. Discuss line symmetry and mirror symmetry.
2. Define: (i) Truncation error (ii) Round-off error (iii) Relative error.
3. Calculate Geometric mean for the following data 4, 8, 16, 32.
4. Define vector and scalar quantity, give examples.
5. Calculate Mean, Standard Deviation for the following Systolic Blood Pressure data:
125, 130, 135, 150, 160, 180
6. Evaluate $\int_{-3}^3 x^4 dx$ using (i) Trapezoidal rule (ii) Simpson's one-third rule.
7. Discuss Newton-Raphson method.
8. What are the properties of the t-test?
9. Write uses of STATISTICA statistical software in data analysis.
10. Discuss Systematic random sampling.

[LJ 1016]

OCTOBER 2016

Sub. Code: 4012

**M.Sc. MEDICAL PHYSICS DEGREE 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) A radiologist has to diagnose a cancer patient from a list of 50 patients, 20 of them women and 30 men and 10 of them were found cancer and other were not. 15 of them urban patients and the remaining were not urban. What is the probability of the radiologist diagnosing a urban woman cancer patient?
b) Find the mean and variance for the following Systolic Blood Pressure of the cancer patients.
108 107 110 125 120 115 121 118 123 113.
2. Find the regression equation of Y on X for the following data and find the expected blood pressure of a person who is 49 years old.
Ages (X): 52 63 45 36 72 65 47 25
Blood Pressure (Y): 62 53 51 25 79 43 60 33

II. Write notes on:

(10 x 6 = 60)

1. Find the positive root of $x^4 - x - 10$ correct to three decimal places using Newton Raphson Method.
2. Law of large numbers.
3. Line symmetry and Mirror symmetry.
4. Frequency distribution.
5. Trapezoidal rule.
6. Properties of 't' distribution.
7. Probability density function.
8. Types of error.
9. Efficiency.
10. Picard's method.

[LL 1017]

OCTOBER 2017

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 $X \sin X + \cos X = 0$ is 2.7984. The initial value of X is 3.14.
2. a) Discuss the assumptions of Karl-Pearson correlation method.
b) Find the Karl-Pearson correlation coefficient for the following data:

X	40	45	48	50	55	50	54	58
Y	120	125	130	125	140	146	154	160

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

1. Define Accuracy and Precision and give an example for each. Find the sum of 0.1874×10^4 and 27.8×10^{-1} . Obtain its round off and truncating approximation in 4 digits mantissa.
2. Calculate the decay constant for cobalt-60 ($T_{1/2} = 5.26$ yrs) in units of month^{-1} .
3. Solve the differential equation $dy/dx = -xy$ for $y(x=0) = 1$ using Picard's method. Perform three iterations.
4. Discuss Binomial distribution.
5. Use Euler's method with $h = 0.5$ to solve initial value problem $dy/dx = yx^2 - 1.1y$ for $x = 0$ to 1 with $y(0) = 1$.
6. Solve $f(x) = \int_{200}^{1000} \frac{1}{\log x} dx$ by eight intervals using Simpson's 1/3 rule.
7. Discuss Systematic random sampling.
8. 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.
9. State the properties and applications of t- distribution.
10. Signal-to-noise ratio.

[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.

[LN 1018]

OCTOBER 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. In an attempt to plot Dose Response curve (DRC), a bioassay was performed with the following results. Find whether any relationship exists.

Log dose	0.3	0.6	0.9	1.2	1.5	1.8	2.1
Response	32	58	94	120	150	174	213

2. a) A study revealed that among 90 males 15 were obese and among 60 females 20 were obese. Use chi square test to find whether sex and obesity are associated. ($\chi^2=3.84$ at 5% level).
b) Discuss precautions for applying chi square distribution.

II. Write notes on:

(10 x 6 = 60)

1. Prepare the decay chart for cobalt-60 teletherapy isotope for the period of one half- life.
2. Define signal to noise ratio.
3. Binominal distribution.
4. Ranga-kutta method.
5. Properties of F test.
6. Define: (i) Truncation error (ii) Round-off error (iii) Relative error.
7. Calculate Mean, standard deviation for the following Diastolic blood pressure data: 93, 90, 95, 85, 90, 78.
8. Evaluate $\int_{-3}^3 x^4 dx$ using (i) Trapezoidal rule (ii) Simpson's one-third rule.
9. Advantages of MATLAB.
10. Presentation of Data.

[LP 1019]

OCTOBER 2019

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) Find the regression equation Y on X for the following data and find the expected SBP of a person who is 60 years old.

Age	40	45	48	50	55	50	54	58
SBP	120	125	130	127	142	140	146	148

- b) Differences between correlation and regression.
2. a) A radiologist has to diagnose a cancer patient from a list of 50 patients, 20 of them women and 30 men and 10 of them were found cancer and others were not. 15 of them were urban patients and remaining were not urban. What is the probability of the radiologist diagnosing a urban women cancer patient?
- b) Difference between Binomial and Poisson distribution.

II. Write notes on:

(10 x 6 = 60)

1. Line symmetry and Mirror symmetry.
2. Truncation error ii) Relative error iii) Absolute error.
3. Properties and applications of 't' distribution.
4. Prepare a decay chart and tabulate for Co-60 isotope for the period one half life.
5. Discuss Euler's method and modified Euler's method.
6. MATLAB.
7. Probability sampling.
8. Presentation of data.
9. Picard's method.
10. Use the Taylor series method of order four to solve the initial value problem $u' = t^2 + u^2, u(0) = 1$.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0321]

MARCH 2021

Sub. Code: 4012

(OCTOBER 2020 EXAM SESSION)

M.Sc. MEDICAL PHYSICS

FIRST YEAR (From 2010-2011 onwards)

PAPER II – RADIOLOGICAL MATHEMATICS

Q.P. Code : 284012

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. Find the regression equation Y on X for the following data.

Urine Albumin (mm/dl) X	9	8	10	20	22	24	28
Creatinine(mm/dl) Y	0.7	0.9	1.5	1.8	1	1.2	1.6

2. Find the standard deviation and variance for the following plot of Dose Responsive Curve in a bioassay.

Response	32	58	94	120	150	174	213
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II. Write Short Notes on:

(10x6 = 60)

1. Compare and contrast between correlation and regression.
2. Properties of 't' test.
3. Improved Euler's formula.
4. Trapezoidal rule.
5. Conventional planar imaging.
6. Explain errors and types of errors.
7. Law of Weak Numbers.
8. Using Taylor's method solve $\frac{dy}{dx} = 1 + xy$ for $y_0 = 0$. Find (i) $y(0,1)$ (ii) $y(0,2)$.
9. Show $\frac{dy}{dx} = x^2 + y^2$ with $y_0 = 1$ by using Picard's method of successive approximation.
10. Advantages of MATLAB.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0921]

**SEPTEMBER 2021
(MAY 2021 EXAM SESSION)**

Sub. Code: 4012

**M.Sc. MEDICAL PHYSICS
FIRST YEAR (From 2010-2011 onwards)
PAPER II – RADIOLOGICAL MATHEMATICS
Q.P. Code : 284012**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. a) Find the Coefficient of Correlation for the following data

HDL cholesterol mg/dl (X)	90	100	80	70	110	60	120
LDL cholesterol mg/dl (Y)	20	25	12	9	30	8	50

- b) Uses of Correlation.

1. a) Difference between Binomial distribution and Poison distribution.
b) Properties of Chi-square test and F-test.

II. Write Short Notes on:

(10x6 = 60)

- Boole rule and Weddle rule.
- Modified Euler's formula.
- Random noise, Structured noise, Statistical noise.
- Parametric and Non parametric correlation.
- Law of Large Numbers.
- Evaluate $\int_0^1 \frac{1}{1+x^2}$ by using Simpson's 3/8 rule. Hence obtain the approximate π , by dividing the range into six equal parts.
- Using Taylor's method find $y(0.1)$ correct to three decimal places from $\frac{dy}{dx} + 2xy = 0$ with $y_0 = 0$.
- Line symmetry and Mirror symmetry.
- Presentation of data.
- Find the mean median and mode for following data.
Uric acid (mm/dl) 3, 9, 6, 11, 15, 8 and 7.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0222]

**FEBRUARY 2022
(OCTOBER 2021 EXAM SESSION)**

Sub. Code: 4012

**M.Sc. MEDICAL PHYSICS
FIRST YEAR
(Candidates admitted from 2010-2011 onwards – Paper II)
(Candidates admitted from 2020-2021 onwards – Paper III)
PAPER II & III – RADIOLOGICAL MATHEMATICS
Q.P. Code : 284012**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. a) Find the Pearson's correlation coefficient between SBP and DBP.

SBP(mmHg) X	70	80	100	110	75	85	90
DBP(mmHg) Y	100	110	120	130	125	135	115

- b) Sensitivity, Accuracy and Precision

2. a) Discuss precautions for applying chi square distribution.
b) Define sampling and Probability sampling methods.

II. Write Short Notes on:

(10x6 = 60)

1. Define Linear and Non linear graphs
2. Oscillation and waves.
3. Detective efficiency, Geometrical efficiency, Intrinsic efficiency.
4. Decay constant and Branding ratio.
5. Central limit theorem.
6. Newton-Rapson method.
7. Define Signal to noise ratio.
8. Three orders of Runge-kutta method.
9. Solve $y' + y = e^x$, $y_0 = 0$ by using Picard's method.
10. Evaluate $\int_0^1 \frac{1}{1+x^2}$ by using 1) Trapezoidal rule 2) Simpson's 1/3 rule.
