The Assam Royal Global University, Guwahati
Royal School of Engineering & Technology
B.Tech. 3rd Semester
Semester End Examination, December, 2018
Course Title : Mathematics-III
Course Code : MAT022C301

Time: 3 Hours **Maximum Marks: 70**

Note: Attempt all questions as per instructions given.
The figures in the right-hand margin indicate marks.

Section – A

Q.1. Answer all questions: (Maximum word limit 50) **[2 × 8 = 16]**

a) If A and B be any two events with $P(A) = 0.4$, $P(A \cup B) = 0.7$, $P(B) = p$, i) Find the value of p for which A and B are independent ii) Evaluate $P(A/B)$.

b) If the distribution function of X is $F(x) = 1 - e^{-x}$; $0 \leq x < \infty$ then find the p.d.f. of X.

c) .If the two regression coefficients are 0.8 and 0.2, what would be the value of Co-efficient of correlation?

d) State normal equations for fitting a straight line $y = a_0 + a_1 x$.

e) Prove that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$

f) Find the divided difference [a, b, c] of the function $f(x) = \frac{1}{x}$.

g) Write the formula for Euler's method for finding the solution of differential equation $\frac{dy}{dx} = f(x, y)$.

h) Write two merits and demerits of Newton Raphson method.

Section - B

Q.2. Answer any two of the following questions: **[6 × 2 = 12]**

a) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

b) In a certain factory turning razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Use Poisson distribution to calculate approximate number of packets containing no defective, two defective and at least 3 defective blades respectively in a consignment of 10000 packets.

c) State Baye's theorem. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of accident is 0.01, 0.03 and 0.15 respectively. One of the insured persons meets an accident. i) Find the probability of accident. ii) What is the probability that he is a scooter driver?

Q.3. Answer any two of the following questions: **[7 × 2 = 14]**

a) Calculate the first four moments of the following distribution about the mean and hence find coefficient of skewness. Also comment on the skewness and kurtosis of the curve.

x:	0	1	2	3	4	5	6	7	8
f:	1	8	28	56	70	56	28	8	1

b) Calculate the co-efficient of correlation and obtain the regression line.

x	1	2	3	4	5	6	7	8	9	10
y	10	12	16	28	25	36	41	44	40	50

c) Define Null hypothesis, Alternative hypothesis and large sample. A die is thrown 9000 times and a throw of 3 or 4 is observed 3240 times. On the assumption of certain throwing do the data indicate an unbiased die?

Q.4. Answer any two of the following questions: $[7 \times 2 = 14]$

a) Find the number of persons getting wages between ₹ 30 and ₹ 35 from the following data:

Wages in ₹	0 – 10	10 – 20	20 – 30	30 – 40
No. of persons	9	30	35	42

b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by Simpson's 1/3 rule and hence evaluate the value of π.

c) Find the first, second and third derivatives of the function tabulated below, at the point $x = 1.5$.

x	1.5	2.0	2.5	3.0	3.5	4
$f(x)$	3.375	7.0	13.625	24.0	38.875	59.0

Q.5. Answer any two of the following questions: $[7 \times 2 = 14]$

a) Find a positive real root of the equation $x^3 + x - 1 = 1$ by bisection method correct upto three significant figures.

b) (i) Using Newton Raphson method find the square root of 12.

(ii) $\frac{dy}{dx} = 3x + y^2$, $y(1) = 1.2$. Using Euler's predictor –corrector method find $y(1.1)$ correct upto two decimal places.

c) Use Runge-Kutta method of fourth order to find $y(0.1)$, $y(0.2)$; given that

$$\frac{dy}{dx} = y - x,\ y(0) = 2.$$