Code: ME3T1, AE3T1

II B.Tech - I Semester–Regular/Supplementary Examinations November 2016

NUMERICAL AND STATISTICAL METHODS
(Common for ME, AE)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer **all** the questions.   All questions carry equal marks
$$11x\ 2 = 22\ M$$

1.
a) Derive the iterative formula for the square root of any number N by using Newton-Raphson's method.

b) Prove that $\mu\,\delta = \dfrac{1}{2}(\nabla + \Delta)$.

c) Using Taylor's series method, solve $y' = xy + y^2,\ y(0) = 1,\ \text{at}\ x = 0.1$

d) Write Milne's Predictor formula and Corrector formula.

e) For the continuous probability function $f(x) = kx^2 e^{-x}$ when $x \geq 0$, find 'k'.

f) The mean of the binomial distribution is 3 and variance is $\dfrac{9}{4}$. Find the value of 'n'

g) Write the Probability axioms.

h) What is the value of correction factor if $n = 5$ and $N = 200$?

i) Define Estimate and Estimator.

j) Explain about type I and type II errors.

k) The mean and standard deviation of a population are 11795 and 14054 respectively. Find confidence interval for the mean if n=50.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2.

a) Find a positive root of $x^3 - x - 1 = 0$ correct to three decimal places by bisection method.   8 M

b) Using Newton's forward interpolation formula, find $f(1.4)$ from the following table.   8 M

x	1.1	1.3	1.5	1.7	1.9
$f(x)$	0.21	0.69	1.25	1.89	2.61

3.

a) Using the Taylor's series method solve
$$\frac{dy}{dx} = 2y + 3e^x, \; y(0) = 0 \; at \; x = 0.1, 0.2$$
       8 M

b) Apply fourth order R-K method to find *y(0.1)* and *y(0.2)* given $y' = xy + y^2$, *y(0)=1*.   8 M

4.

a) Out of 800 families with 5 children each, how many would you expect to have (a) 3 boys (b) 5 girls (c) either

2 or 3 boys (d) at least one boy. Assume equal probabilities for boy and girl.   8 M

b) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution.   8 M

5.
a) A population consists of five numbers 3,6,9,15 and 27. Consider all possible samples of size two which can be drawn with replacement from this population. Find
i) The mean of the population
ii) The standard deviation of the population
iii) The mean of the sampling distribution of means and
iv) The standard deviation of the sampling distribution
   of means.   8 M

b) What is the size of the smallest sample required to estimate a unknown proportion to within a maximum error of 0.06 with at least 95% confidence.   8 M

6.
a) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population.   8 M

b) A random sample of 10 boys had the following I.Q's: 70, 120, 110, 101, 88, 83, 95, 98, 107 and 100.

i) Do these data support the assumption of a population mean I.Q of 100?

ii) Find a reasonable range in which most of the mean I.Q. values of samples of 10 boys lie.

8 M