PVP 12

II B.Tech - I Semester – Regular Examinations - December 2014

MATHEMATICS - III
(Common for ME, AE)

Duration: 3 hours   Marks: 5x14=70

Answer any FIVE questions.   All questions carry equal marks

1. a) Find a positive root of $x - \cos x = 0$ by bisection method.

7 M

b) Find an iterative formula to find $\sqrt{N}$ (where N is a positive number) and hence find $\sqrt{5}$.   7 M

2. a) From the following table find $\tan 17°$.   7 M

θ:	0	4	8	12	16	20	24
$\tan \theta°$:	0	0.0699	0.1405	0.2126	0.2167	0.3640	0.4402

b) Use Lagrange's formula to fit a polynomial to the following data and hence find y(x=1).   7 M

x:	−1	0	2	3
y:	−8	3	1	12

3. a) Find the value of $\log 2^{1/3}$ from $\int_0^1 \frac{x^2}{1+x^3}dx$ using Simpson's one-third rule with h=0.25. 7 M

   b) Find the value of cos(1.74) from the following table. 7 M

x:	1.7	1.74	1.78	1.82	1.86
$\sin x$:	0.9916	0.9857	0.9781	0.9691	0.9584

4. Obtain the values of y at x = 0.1, 0.2 using Runge Kutta method of fourth order for the differential equation $y' = -y$, given y(0)=1. 14 M

5. a) Let X denote the number of heads in a single toss of 4 fair coins. Determine

   (i) $P(X < 2)$ and (ii) $P(1 < X \le 3)$. 7 M

   b) A continuous random variable X has the probability density function

   $$f(x) = \begin{cases} kxe^{-\lambda x} & \text{when } x \ge 0, \ \lambda > 0 \\ 0 & \text{elsewhere} \end{cases}$$

   Determine k, mean and variance. 7 M

6. a) Determine the probability of getting a sum of 9 exactly twice in 3 throws with a pair of fair dice. 7 M

b) In a normal distribution exactly 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution. 7 M

7. a) What is the size of the smallest sample required to estimate an unknown proportion within a maximum error of 0.06 with at least 95% confidence. 7 M

b) A research worker wishes to estimate mean of a population by using sufficiently large sample. The probability is 95% that sample mean will not differ from the true mean by more than 25 percentage of the standard deviation. How large a sample should be taken. 7 M

8. a) A coin is tossed 960 times and head turned up 183 times. Is the coin unbiased? 7 M

b) A machine is designed to produce insulating washers for electrical devices of average thickness of 0.025 cm. A random sample of 10 washers was found to have a mean thickness of 0.024 cm. with a standard deviation of 0.002 cm. Test the significance of the deviation at 5% level.

7 M