Unit II

4. (a) Given :

θ°	$\tan\theta$
0	0
5	0.0875
10	0.1763
15	0.2679
20	0.3640
25	0.4663
30	0.5774

Using Sterling formula, show that : **2**

$$\tan 16^\circ = 0.2867 .$$

(b) Apply Bessel's formula to obtain y_{25}, given $y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3992$. **2**

5. (a) Two cards are drawn without replacement from a well shuffled pack of 52 cards. Find the mean and variance of the number of aces. **2**

Subject Code—52013

B. A. EXAMINATION

(Batch 2017) (Re-appear)

(Fifth Semester)

MATHEMATICS

BM-353

Numerical Analysis

Time : 3 *Hours* *Maximum Marks :* 20

Note : Attempt *Five* questions in all. Q. No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) Prove that :

$$\Delta\cos(cx+d) = 2\sin\frac{ch}{2} - \cos\left(cx+d+\frac{ch+n}{2}\right)$$

(b) Find the third divided difference with arguments 2, 4, 9, 10 of the function $f(x) = x^3 - 3x$.

(c) A die is thrown six times. Getting an odd number is a success. What is the probability of getting at least 5 successes ?

(d) Given that 2% of screws manufactured by a company are defective. Use Poisson distribution to find the probability that a packet of 100 screws contains one defective screw ($e^{-2} = 0.14$).

(e) Evaluate $\int_0^6 \frac{1}{1+x^2}\,dx$ by using Simpson's one-third rule. **5×.8=4**

Unit I

2. (a) Find the missing term in the following table : **2**

x	:	0	1	2	3	4	5
y	:	1	2	4	8	–	32

(b) From the following table, find the number of students who obtained marks less than 45 : **2**

Marks	**No. of Students**
30-40	31
40-50	42
50-60	51
60-70	35
70-80	31

3. (a) From the following table, find $f(3.5)$ using Lagrange's interpolation with a quadratic interpolation polynomial : **2**

x	:	1	2	3	4
$f(x)$	:	1	8	27	64

(b) Find the Hermite's polynomial of fifth degree which fits the following data : **2**

x	$f(x) = \log x$	$f'(x) = \frac{1}{x}$
2.0	0.6932	0.5000
2.5	0.9163	0.4000
3.0	1.0986	0.3333

(b) If the variance of the Poisson distribution is 2, find the probabilities for X = 1, 2, 3, 4 and 5 from the recurrence relation of the distribution. **2**

Unit III

6. (a) Find the first and second derivatives of the function tabulated below, at $x = 1.0$: **2**

x	$f(x)$
1	1.000
1.05	1.0247
1.10	1.0488
1.15	1.0723
1.20	1.0954
1.25	1.1180
1.30	1.1401

(b) Use power method to find the largest eigen value of the matrix $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$, upto five steps only. **2**

7. Reduce the matrix $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 4 & 2 \\ 3 & 2 & 3 \end{bmatrix}$, to tri-diagonal form, using Given's method. **4**

Unit IV

8. (a) Evaluate $\int_{0.5}^{0.7} x^{1/2} e^{-x}\, dx$ approximately by using suitable formula. **2**

(b) Evaluate the integral $\int_{-1}^{1} \frac{dx}{1+x^2}$ using Gauss's quadrature formula for $n = 2$ and $n = 3$. **2**

9. (a) Using simple Euler's method solve for y at $x = 0.1$ from $\frac{dy}{dx} = x + y + xy$, $y(0) = 1$, taking steps size $h = 0.025$. **2**

(b) Given :

$\frac{dy}{dx} = x^2(1+y)$ and $y(1) = 1$, $y(1.1) = 1.233$, $y(1.2) = 1.548$, $y(1.3) = 1.979$. Evaluate $y(1.4)$ by Adams-Bashforth method. **2**