(b) Apply Bessel's formula to obtain y_{25}, given $y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3992$. **3**

5. (a) Find the mean of the random variable X, which denotes the number of doublets in four throws of a pair of dice. **3**

(b) A pair of dice is thrown 200 times. If getting a rum of 9 is considered a success, using Poisson distribution find the mean of the number of successes. **3**

Section III

6. (a) Find the derivative of $f(x)$ at 0.4, from the following table : **3**

x :	0.1	0.2	0.3	0.4
$f(x)$:	1.10517	1.22140	1.34986	1.49182

(b) Using Jacobi's method, find all the eigen values and eigen vectors of the matrix

$$\begin{bmatrix} 1 & -2 & 4 \\ -2 & 5 & -2 \\ 4 & -2 & 1 \end{bmatrix}.$$ **3**

Roll No. .... **Exam Code : M-21**

Subject Code—52472

B. Sc. EXAMINATION

(Batch 2017) (Reappear)

(Fifth Semester)

MATHEMATICS

BM-353

Numerical Analysis

Time : 3 *Hours* *Maximum Marks* : 30

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

(Compulsory Question)

1. (a) Evaluate $\Delta^n \sin^2 x$.

(b) Given $f(0) = 8$, $f(1) = 68$ and $f(5) = 123$, construct a divided difference to determine $f(2)$.

(c) A die is thrown 6 times. Getting an odd number is a success. What is the probability of getting 5 successes ?

(d) If m is the parameter of a Poisson distribution, find the probability that the variable takes any of the values 0, 1 or 2.

(e) Find the largest eigen value of the matrix

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}.$$

(f) Using Picard's first approximation, find the first approximation of the differential equation $\frac{dy}{dx} = 2 - \frac{y}{x}$, $y(1) = 2$. **6×1=6**

Section I

2. (a) Estimate the missing term in the following table : **3**

x :	0	1	2	3	4
y :	1	3	9	–	81

(b) Given $\sin 45° = 0.7071$, $\sin 50° = 0.7660$, $\sin 55° = 0.8192$, $\sin 60° = 0.8660$. Find sin52° by using Newton's formula for forward interpolation. **3**

3. (a) The values of the function $f(x)$ for values of x are given as $f(1) = 4$, $f(2) = 5$, $f(7) = 5$, $f(8) = 4$; find the value of $f(6)$, using Lagrange's formula. **3**

(b) Find a Hermite polynomial of degree 3, which fits the following data : **3**

x	$f(x)$	$f'(x)$
0.5	4	–16
1	1	–2

Section II

4. (a) Find the value of $f(x)$ at $x = 32$ from the following table, using Gauss forward formula : **3**

x :	25	30	35	40
$f(x)$:	0.2707	0.3027	0.3386	0.3794

(b) Given $\frac{dy}{dx} = 1 + y^2$, where $y(0) = 0$, $y(0.2) = 0.2027$, $y(0.4) = 0.4228$, $y(0.6) = 0.6841$. Using Milne-Simpson's method, compute $y(0.8)$. **3**

7. Using Given's method, reduce the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$ to tri-diagonal form. **6**

Section IV

8. (a) Evaluate $\int_0^3 \frac{1}{1 - x^2} dx$ using Simpson's $\frac{1}{3}$rd rule, taking $h = \frac{1}{2}$. **3**

(b) Find $\mathrm{I} = \int_0^1 x\, dx$ by Gauss's formula with n = 4, upto 5 decimal places. **3**

9. (a) Using Euler's method, find an approximate value of y corresponding to x = 1, given that $\frac{dy}{dx} = x + y$ with initial condition y = 1 at x = 0. **3**