

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS) 14 MD01-2- / J4-0CVO\$ <4 MB 01 b  
BSc DEGREE EXAMINATION MAY 2017 'HBC008  
(Second/Third/Fourth Semester)

Common to Branches - NUTRITION, FOOD SERVICE MANAGEMENT &  
DIETETICS / BIOCHEMISTRY & MICROBIOLOGY

MATHEMATICS

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10x2 = 20)

- 1 State Cayley Hamilton theorem.
  - 2 Define characteristic equation.
  - 3 Write down the expansion of  $\sin n\theta$ .
  - 4 If  $\tan^{-1} \frac{2524}{0} \tan^{-1} \frac{2523}{0}$  find  $\theta$ .
  - 5 Show that the points (5, 3, -2), (3, 2, 1) and (-1, 0, 7) are collinear.
  - 6 Find the angle between the planes  $2x - y + z = 6$ ;  $x + y + 2z = 3$ .
  - 7 Derive the relationship between E, V & A.
  - 8 State Newton's forward interpolation formula.
  - 9 State Simpson's one third rule.
  - 10 From the following table, find the area bounded by the curve and the x axis from  $x = 7.47$  to  $x = 7.52$ .
- |    |      |      |      |      |      |      |
|----|------|------|------|------|------|------|
| X: | 7.47 | 7.48 | 7.49 | 7.50 | 7.51 | 7.52 |
| Y: | 1.93 | 1.95 | 1.98 | 2.01 | 2.03 | 2.06 |

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5x5 = 25)

- 11 a Find the characteristic roots of the orthogonal matrix  $\begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$  and verify that they are of unit modulus.  
OR  
b Show that the characteristics roots of the equation  $\begin{vmatrix} a+x & h & g \\ h & b+x & f \\ g & f & c+x \end{vmatrix} = 0$  are real if a, b, c, f, g, h are real.
- 12 a  $\sin^{-1} \frac{863}{x}$  find an approximate value of x.  
OR  
b Prove that  $\cos 80^\circ = 1 - 32\sin^2 20^\circ + 160 \sin^4 20^\circ - 256 \sin^6 20^\circ + 128 \sin^8 20^\circ$ .
- 13 a If two pairs of opposite edges of a tetrahedron be at right angles, show that the third pair is also at right angles.  
OR  
b Find the equation of the plane passing through the point (2, -5, 3), (-2, -3, 5) and (5, 3, -3).

Cont....

- 14 a Given  $\log_{10} 654 = 2.8156$ ,  $\log_{10} 658 = 2.8182$ ,  $\log_{10} 659 = 2.8189$ ,  $\log_{10} 661 = 2.8202$ . Find the value of  $\log_{10} 656$  using Newton divided difference formula.

OR

- b Find the form of the function given by

x:	3	2	1	-1
f(x):	3	12	15	-21

- 15 a The population of a town is given below. Find the rate of growth of population in 1931.

Year:	1931	1941	1951	1961	1971
Population:	40.62	60.80	79.95	103.56	132.65

OR

- b The following table gives the result of an observation. Find  $\theta$  when  $t = 8$ .

t:	1	3	5	7	9
$\theta$ :	85.3	74.5	67.0	60.5	54.3

### SECTION - C (30 Marks!)

\* • • . Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30) •

- 16 Diagonalise the matrix  $\begin{vmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{vmatrix}$

- 17 Show that  $128 \sin^8 \theta = \cos^8 \theta - 8 \cos^6 \theta + 28 \cos^4 \theta - 56 \cos^2 \theta + 35$ .

- 18 Find the area of circles with diameters 82 and 91 from the following data,

d:	80	85	90	95	100
A:	5026	5674	6362	7088	7854

- 19 Evaluate ----- by (i) Trapezoidal rule (ii) Simpson's rule

$\int_0^1 (x^2 + x) dx$ ,

(iii) Weddle's rule.

- 20 A line makes angles  $\alpha, \beta, \gamma, \delta$  with the four diagonals of a cube

Prove that  $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma + \cos^2 \delta = 2$

**Z-Z-Z**

END