

Mathematics
2007 November
Technology BCA
Semester 1
University Exam
Mangalore University

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Credit Based First Semester BCA Degree Examination
October / November 2007
(New Syllabus)

MATHEMATICS

Time : 3 Hours

Max. Marks : 80

PART-A

Note: Answer any 10 questions from the following:

1. a. Define partial fraction. Give an example.
- b. Find the value of $\log_{\sqrt{2}} 32$.
- c. If $15C_{3r} = 150C_{r+3}$, find r.
- d. Convert i) 15° into radians.
ii) $\frac{2\pi^c}{3}$ into degrees.
- e. Show that $\cos^2 30^\circ - \cos^2 60^\circ = \sin 30^\circ$.
- f. Show that $\cos^2 (45^\circ - \theta) + \cos^2 (45^\circ + \theta) = 1$.
- g. Find the coordinates of the centroid of the triangle with vertices (2, 3), (-5, 2) and (1, 7).
- h. Find the equation of a line with slope $-2/3$ and passing through the point (5, -2).
- i. Find the length of the perpendicular drawn from the point (3, 5) to the line $6x - 8y + 11 = 0$.
- j. In an ellipse the major and minor axes are in the ratio 5:3, What is the eccentricity?
- k. Show that the equation $x^2 + y^2 + 4x + 6y + 13 = 0$ represents a point circle.
- l. Define hyperbola. Write the standard form. 2x10=20

PART-B

Note : Answer ONE full question from each unit.

UNIT-I

2. a. Define improper fraction. Express $\frac{3x^2 - 4x + 5}{x - 1}$ as a sum of a polynomial and a proper fraction. 04
- b. Show that $7 \log \frac{16}{15} - 5 \log \frac{24}{25} + 3 \log \frac{81}{80} = \log 2$ 06
- c. Using Binomial theorem, find the 7th power of 11. 05

OR

Contd... 2

3. a. Resolve $\frac{x+1}{(x-1)^2(x-2)}$ into partial fractions. 05
- b. Using logarithms, find the value of
- i) 12.96×0.362 ii) $\sqrt{\frac{140}{97} \times \frac{117}{116}}$ 05
- c. Find the middle terms in the expansion of $\left[2x - \frac{4}{x}\right]^7$ 05

UNIT-II

4. a. Define radian. Prove that radian is a constant. 05
- b. Given $\cot \theta = \frac{24}{7}$ and θ is acute, find the values of other trigonometric functions of θ . 05
- c. i) Prove that $\frac{\sin^2 \theta}{1 - \cos \theta} - \frac{\cos^2 \theta}{1 - \sin \theta} = \cos \theta - \sin \theta$
- ii) Simplify $\frac{\cos \theta}{\sec \theta + \tan \theta} + \frac{\cos \theta}{\sec \theta - \tan \theta}$ 05

OR

5. a. Find in radian, the acute angle between the hour hand and minute hand of a clock when the time is 10 hours 40 minutes. 05
- b. Simplify $\frac{\sin(2\pi - A) \cos(\pi + A) \tan\left(\frac{\pi}{2} - A\right)}{\sin\left(\frac{\pi}{2} - A\right) \cos(2\pi - A) \sin(\pi - A)}$ 06
- c. Solve $\triangle ABC$, given that $a = 5$, $b = 5\sqrt{3}$, $c = 5$ 04

UNIT-III

6. a. Show that the points $A(1, 7)$, $B(-1, 1)$ and $C(0, 4)$ are collinear. 04
- b. Find the area of the triangle formed by the points $A(-3, 0)$, $B(4, -)$ and $C(5, 2)$. Hence find the length of the altitude from A . 06
- c. Find the equations of the sides of the triangle formed by the point $A(2, 4)$, $B(4, 6)$ and $C(3, -6)$. 05

OR

7. a. Show that the points $(2, -3)$, $(6, 5)$, $(-2, 1)$ and $(-6, -7)$ taken in order are the vertices of a rhombus. Also find its area. 05
- b. Find the ratio in which the line joining the points $(3, 5)$ and $(-7, 9)$ is divided by the point $(1/2, 6)$. 04
- c. Find the equations of the straight lines passing through $(2, 4)$ and
- (i) parallel to (ii) perpendicular to the line $5x - 7y = 100$ 06

Contd... 3

UNIT-IV

8. a. Find the focus, directrix, vertex, axis, the end points of latus rectum and the length of latus rectum of the parabola $y^2 = 8x$. 05
- b. Find the equation of the tangent to the circle $2(x^2+y^2)-3x+7y-3=0$ at $(1, -4)$. 05
- c. (i) Prove that $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$ for all +ve integers n.
- (ii) Evaluate $\lim_{x \rightarrow -3} \frac{x^5 + 243}{x + 3}$ (3+2)

OR

9. a. Find the vertices, length of major axis, length of minor axis, foci and directrices of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ 05
- b. Evaluate (i) $\lim_{\theta \rightarrow 0} \frac{\sin 3\theta \tan 4\theta}{\theta \sin 5\theta}$ (ii) $\lim_{x \rightarrow 0} \frac{\sin 3x^2}{\tan^2 3x}$ 05
- c. (i) Find the centre and radius of the circle $x^2 + y^2 - 4x + 6y + 8 = 0$
- (ii) Find the length of the tangent from $(-3, 1)$ to the circle $3x^2 + 3y^2 - 5x - 6y - 12 = 0$
- (iii) Write the equation of the circle with
- (i) centre at (h, k) and radius r .
- (ii) centre at $(0, 0)$ and radius r . (1+2+2)
