

Vidya Vikas Mandal's

Shree Damodar College of Commerce & Economics Margao Goa

F.Y.BCA, Semester I, Semester End Examination, October 2016

BASIC MATHEMATICS

Duration: 2 Hours

Total Marks: 50

Instructions:

- I. Figures to the right indicate maximum marks
- II. Start each answer on a fresh page
- III. All questions are compulsory
- IV. Calculators are not allowed

Q.1 Attempt the following

A. Match the following

Marks (1X5)

A

B

- i. Volume of a cylinder
- ii. Derivative of $\sin x$
- iii. Integral of $\sin x$
- iv. Total surface area of a cylinder
- v. a, b, c are in A.P then

- a) $\cos x$
- b) $2\pi r(r + h)$
- c) $b = \frac{a+c}{2}$
- d) $b = \sqrt{ac}$
- e) $\frac{1}{x}$
- f) $-\cos x$
- g) $\pi r^2 h$

B. Fill in the blanks

Marks (1X5)

- a. Proper divisors of 4 are
- b. The ratio of 45kg and 50000gms is.....
- c. L.C.M of 23 and 24=.....
- d. Two numbers are in the ratio 5:7.If the smaller number is 80, the bigger number is
- e. Cofactor of the matrix $\begin{bmatrix} -3 & 3 \\ -4 & -1 \end{bmatrix} = \dots\dots\dots$

Q.2 Answer the following questions (any two)

Marks (5X2)

A. Evaluate the following integrals

- i. $\int \frac{2x^2+4x+5}{x} dx$
- ii. $\int_0^{\log 3} \frac{e^x}{1+e^x} dx$

- B. Find the equation of the line through (2, 1) perpendicular to the line through (-3, -1) and (-1, 2).
- C. Find three numbers in G.P such that their sum is 70 and the product is 8000.

Q.3 Answer the following (any two)

Marks (5X2)

- A. Prove that
- $\cos 2\theta = \cos^2 \theta - \sin^2 \theta$
 - $\sin 2\theta = 2 \sin \theta \cos \theta$
- B. Solve the following simultaneous equations by using Cramer's rule
- $$2x + 7y = 32, x + y = 11$$
- C. Find the cofactor, adjoint, determinant and inverse of the matrix $\begin{bmatrix} 5 & -1 \\ 3 & 4 \end{bmatrix}$

Q.4 Answer the following (any two)

Marks (5X2)

- A. Evaluate the following limits
- $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$
 - $\lim_{x \rightarrow 2} \left[\frac{1}{x^2 + x - 6} - \frac{1}{x^2 - 9x + 14} \right]$
- B. Write $z = 2\sqrt{3} + 2i$ in polar form.
- C. Discuss the continuity of the following function at $x = 2$ and $x = 4$

$$f(x) = \begin{cases} \frac{1}{x-1} & 0 \leq x \leq 2 \\ x & 2 < x \leq 4 \\ \frac{x+1}{x-5} & 4 < x \leq 6 \end{cases}$$

Q.5 Answer the following (any two)

Marks (5X2)

- A. Differentiate the following with respect to x
- $(x^2 - 3x + 9)^{12}$
 - $x^2 - 5x - 12 \log x - e^x + 17$
- B. Find the sum of first n terms of the sequence $2, 1, \frac{1}{2}, \frac{1}{4}, \dots$ and hence find the sum of first 10 terms.
- C. If $\vec{a} = 2\hat{i} + 3\hat{j} - \hat{k}$ and $\vec{b} = 4\hat{i} + 3\hat{j} - 2\hat{k}$ find $\vec{a} \times \vec{b}$ and $\vec{a} \cdot \vec{b}$.
Also verify that $\vec{a} \times \vec{b} = -\vec{b} \times \vec{a}$

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