Goa Vidyaprasarak Mandal's
GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND
ECONOMICS, PONDA-GOA
B.C.A. (SEMESTER-I) EXAMINATION, OCTOBER 2016
BCA 104 BASIC MATHEMATICS

Duration : 2 hours   Marks : 50

Q.1. Fill in the blanks: (10×1=10)

   a) Prime factorisation of 972 is _____ .

   b) If $f(x) = 5x^2 - 2x$, then $\int_1^2 f(x)dx =$_____.

   c) If $\sin\theta = \frac{3}{5}$ and $\cos\theta = \frac{4}{5}$, then $\tan\theta =$_____.

   d) If $y = x^4 - 5x^2$, then $y' =$_____.

   e) $\lim_{x\to 0} \frac{a^x - 1}{x} =$_____.

   f) $\gcd(68,154) =$ _____.

   g) Let $\log_7 343 =$_____.

   h) In an A.P. $a = 5$ and $d = 4$, then $S_6 =$ _____.

   i) Let $A = \begin{bmatrix} 1 & -3 & -2 \\ 4 & 0 & 7 \\ 5 & 2 & 8 \end{bmatrix}$, then $A' =$_____.

   j) Let $z_1 = 3 - 4i$ and $z_2 = -7 + 8i$, then $z_1 + \bar{z}_2 =$_____.

Q.2.
   a) Find the area of a parallelogram whose adjacent sides are $3\hat{i} + 4\hat{j} - \hat{k}$
      and $4\hat{i} - 2\hat{j} + 5\hat{k}$.   (3)

   b) Use De Moivre's theorem to prove that $sin2\theta = 2sin\theta cos\theta$.   (2)

   c) If $= \begin{bmatrix} 5 & 7 \\ 4 & -1 \end{bmatrix}$, find $4A^2 + 3A - 2I$.   (5)

                                           OR
   d) Find the area of a triangle whose sides are $2\hat{i} + 4\hat{j} + 7\hat{k}$ and
      $-\hat{i} + \hat{j} - 3\hat{k}$.   (3)

   e) Let $z = 2 + 3i$, verify $z\bar{z} = |z|^2$.   (2)

   f) Solve the following system of equations by using matrix method.   (5)
      $3x - 4y + 5z = 0$, $x + 2y - 4z = 0$, $7x + 3y + 6z = 0$
Q.3.
   a) Check whether the vectors $a = 2\hat{i} - 4\hat{j} + 3\hat{k}$ and $b = 3\hat{i} + 6\hat{j} + 6\hat{k}$
      are perpendicular.   (2)

   b) Find the area of the dotted region.   (3)
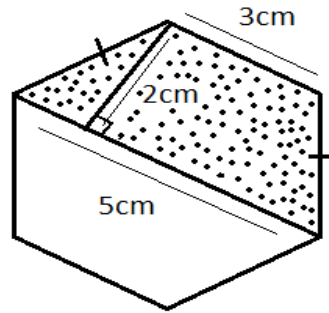
c) In a bag, there are coins of 25p, 10p and 5p in the ratio 1:2:3. If there is ` 30 in all, how many 5p coins are there? (5)

OR

d) Find angle between the two vectors $a = \hat{\imath} - 2\hat{\jmath} + \hat{k}$ and $b = 2\hat{\imath} + \hat{\jmath} - 3\hat{k}$. (2)

e) The diameter of a cone is 10m and its slant height is 13m.Find its volume. (3)

f) The sum of three numbers is 98. If the ratio of the first to second is 2:3 and that of the second to the third is 5:8, then find the three numbers. (5)

Q.4.

a) Let $z_1 = -3 + 4i$ and $z_2 = 2 + 5i$. Verify $z_1 z_2 = z_2 z_1$. (2)

b) Find the three numbers in A.P. whose sum is 27 and product is 585. (3)

c) Check whether (2,1), (6,5) and (4,7) are the vertices of a right angled triangle. (5)

OR

d) Write $z = 2 + i$ in polar form. (2)

e) Find the three numbers in G.P. whose sum is 39 and product is 729. (3)

f) Check whether the points (-1,1), (-2,0) and (1,2) are collinear. (5)

Q.5.

a) Let $f(x) = x^2 + 2$ and $g(x) = \log x$. Find $(f \bullet g)(x)$. (2)

b) Let $f(x) = \frac{x^2 - 8x + 16}{x^2 - 16}$, find $\lim_{x \to 4} f(x)$. (2)

c) Examine the function $f(x) = x^2 + 2x$ for maxima or minima. (3)

d) Evaluate $\int_0^1 x^2 + e^x + \frac{1}{x^2} \, dx$. (3)

OR

e) Check whether $f(x) = \begin{cases} x^2 & x \le 0 \\ -x^2 & x > 0 \end{cases}$ is continuous. (2)

f) Find $\lim_{x \to 2} \frac{x^3 - 8}{x - 2}$. (2)

g) Examine the function $f(x) = 2x^2 - 5x$ for maxima or minima. (3)

h) Evaluate $\int_0^2 \sin x - 2^x \, dx$. (3)

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