SARDAR PATEL UNIVERSITY
F.Y.B.Sc. (I SEM) (CBCS) EXAMINATION
2010
Thursday, 25th November
11.30 a.m. to 1.30 p.m.
US01EMTH02 : MATHEMATICS

Total Marks : 70

Note :

(1) Answers of all the questions (including multiple choice questions) should be written in the provided answer book only.
(2) Figures to the right indicate full marks.
(3) For Q.3 to Q.6, each sub-questions are of equal mark 5.

Q: 1 [10]

Indicate your choice of correct answer for each sub-question in your answer book by writing sub-question number and one of the latter a, b, c, d whichever is appropriate

(1) A function f= {(1,2),(2,5),(3,8),(4,11)}. The domain of function f is equal to

(a) {1,3,4} (b) {2,5,8,11} (c) {1,2,3,4} (d) { }.

(2) If z = -4+3i then |z| = -----

(a) 6 (b) 5 (c) 4 (d) 3

(3) The root of the equation $x^2 - 5x + 6 = 0$ are

(a) 3 , -2 (b) -3 , -2 (c) -3, 2 (d) 3 ,2,

(4) The set of zero's of sine function is {--------: k is an integer}

(a) $(2k+1)\pi/2$ (b) $(4k+3)\pi/2$ (c) $k\pi$ (d) $(2k-1)\pi/3$

(5) The range of cosine function is

(a) [-1,1] (b) [-1,1) (c) (-1,1] (d) (-1,1)

(6) $\log_b a \times \log_c b \times \log_a c$ = ------ a,b,c are positive integer

(a) -1 (b) +1 (c) 0 (d) $a^2 b^2 c^2$

(7) $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} =$ ____________. (7) $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} =$ ________

(a) -1 (b) 0 (c) 1 (d) $a^3 b^3 c^3$

(8) A= $\begin{pmatrix} 1 & -3 \\ 2 & 5 \end{pmatrix}$ and B = $\begin{pmatrix} 5 & 7 \\ -3 & 3 \end{pmatrix}$ then A+B =____________.

(a) $\begin{pmatrix} 6 & 10 \\ 05 & 8 \end{pmatrix}$ (b) $\begin{pmatrix} 4 & -10 \\ 5 & 2 \end{pmatrix}$ (c) $\begin{pmatrix} 6 & 4 \\ -1 & 2 \end{pmatrix}$ (d) $\begin{pmatrix} 6 & 4 \\ -1 & 8 \end{pmatrix}$

(9) 4(1, 2, 1) + 2(1, 3, 3) = ____________.

(a) (3,7,5) (b) (6,14,10) (c) (9,21,15) (d) (2,5,3)

(10) $\bar{X}$=(1,2,2) then $|\bar{X}|$= ____________.

(a) 3 (b) 4 (c) 5 (d) 9

Q: 2 Attempt any TEN [20]

(1) Find a complex number α such that $[(2,-5)\cdot(6,3)]\alpha = (4,0)$.

(2) f:R →R define by $f(x)=(x+1)/(x-1), x\neq 1$ .Find fof(x) ,$x \in R-\{0,1\}$.

(3) f:R →R define by $f(x)= 2x+3, x \in R$. Does f one-one? Why?.

(4) In usual notation prove that $1+\tan^2\Theta=\sec^2\Theta$.

(5) Evaluate; $\log(a^2/bc)+\log(b^2/ac)+\log(c^2/ ab)$, a,b,c are +ve integers.

(6)If $A=\begin{pmatrix} 1 & 5 \\ 7 & 3 \end{pmatrix}$ Then find $A+A^T$.

(7) If $\sin\Theta + \mathrm{cosec}\Theta = 2$ then prove that $\sin^n\Theta + \mathrm{cosec}^n\Theta = 2$, n is a +ve integer.

(8)By using Cremer's rule solve the equations x+2y-3=0, 2x-3y+4=0.

(9) Evaluate: $\begin{vmatrix} 1 & -x & -y \\ x & 1 & -z \\ y & z & 1 \end{vmatrix}$.

(10) $\vec{x}=(3,2,1)$ and $\vec{y}=(1,2,-1)$ find $\vec{x}\cdot\vec{y}$.

(11) Evaluate: $\vec{x}\times\vec{y}$ where $\vec{x}=(1,1,2)$ and $\vec{y}=(1,2,3)$.

(12) Find value of a and b such that a(3,1)+b(4,2)=(1,0).

Q:3 [10]

(1) A functions f:N→N, g:N →N defined by f(x)=2x+3 and g(x)=3x+2, find fog and gof. Does fog(2) = gof(2)? Why?

(2)Express the complex number $z=[(1-5i)/(1+2i)]^2$ in the form of a + ib where a and b are real numbers.

OR

Q:3

(1) Solve the equation $5(x-2)^2 +17x-22=0$.

(2) Define: Complex conjugate and Modulus of a complex number.

If $z=(4+3i)^3$ then find $|z|$ and $\bar{z}$.

Q:4 [10]

(1) Prove that sin(10π/3)cos(11π/6) + cos(2π/3)sin(5π/6) -1

(2) Solve log(2)+log(x+2) – log(3x-5) = log3.

OR

Q:4

(1) Prove that $\sqrt{(Sec\theta-1)/(\sec\theta+1)} = \frac{1-\cos\theta}{|\sin\theta|}$

(2) Simplify : log(11/15)+log(490/297) – 2log(7/9).

Q:5 [10]

(1) If A= $\begin{pmatrix} -1 & 2 & 6 \\ 6 & 2 & -1 \\ 3 & 4 & 7 \end{pmatrix}, B = \begin{pmatrix} 3 & 4 & 5 \\ 4 & 3 & 2 \\ 0 & 2 & -1 \end{pmatrix}$ then find , BA and $A^T \cdot B$

(2) Prove that $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$ = (a-b)(b-c)(c-a)

OR

Q:5

(1)If A = $\begin{pmatrix} 1 & 2 \\ 3 & -1 \end{pmatrix}$ then find $A^3+A^2-5A+7I_2$.

(2)If A= $\begin{pmatrix} 1 & -1 & 4 \\ 2 & 6 & 5 \\ & & \end{pmatrix}$ and B= $\begin{pmatrix} -2 & 6 & 3 \\ 0 & 2 & 7 \\ & & \end{pmatrix}$

then find 2A+3B , $(3A-2B)^T$ and $A^T \cdot B$.

Q:6 [10]

(1)Find value of a,b and c such that a(1,1,1)+b(2,1,2)+c(1,0,0)=(1,1,1).

(2) Evaluate $(\bar{y} \times \bar{z}) \cdot \bar{x}$ where $\bar{x}$ = (1,2,3), $\bar{y}$ = (2,3,4) and $\bar{z}$ = (-1,2,-3).

also find $\bar{x} \cdot \bar{y} + \bar{y} \cdot \bar{z}$.

OR

Q:6

(1) If $\bar{x} = (1,1,2), \bar{y} = (1,2,1), \bar{z} = (2,1,1)$ then find $\bar{x} \times \bar{y} \times \bar{z}$

(2) If α, β and γ are directional angle of $\bar{x}$=(2,1,3)+(-1,-2,-1)

then prove that $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1$.

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