KERALA AGRICULTURAL UNIVERSITY

B.Sc (Hons.) Forestry 2015 Admission

Ist Semester Final - Examination- March-2016

Cat. No: Bash. 1102
Title: Basic Mathematics (2+0)

Marks: 50.00
Time: 2 hours

I Fill up the blanks **(10 xI=10)**

1. $(\cos\theta + i \sin\theta)^n$ =.....
2. The 4th term of 3, 12, 48, is.....
3. If A be any square matrix (A+A') is .....and (A-A') is.....
4. The degree measure corresponding to ¼ radian is.....
5. Period of the function Cos θ is.....
6. A function which has same differential and integral is.....
7. The first four terms in the expansion of $(1+x)^{-1}$ is.....
8. $10\ C_4$=.....
9. A matrix A is orthogonal if.....
10. Integral $Cosec^2$ x is.....

II Write answers on any FIVE questions **(5 x 2=10)**

1. Find for what values of x, the function $x^3 - 9x^2 + 24x + 7$ is
   a) Increasing b) Decreasing C) Stationary
2. Prove the following: i) $\int_a^b f(x)\,dx = \int_{-b}^{a} f(x)\,dx$ ii) $\int_a^b f(x)dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$
3. Find the inverse of $\begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$
4. Solve by Cramer's rule: x+y+z=7, 2x+3y+2z=17,4x+9y +z=37.
5. If A= $\begin{bmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix}$ B= $\begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3 \end{bmatrix}$ C= $\begin{bmatrix} 4 & 1 & 2 \\ 19 & -5 & 10 \\ 1 & -3 & 0 \end{bmatrix}$

   Verify that A (B+C) = AB + AC
6. Find the area bounded by the curve $y=x^2+x+2$, x-axis and the ordinates at x=1, x=2.
7. What are the methods of integration?

III Write answers on any FIVE questions

(5 x 4 =20)

1. Find the area enclosed between the two parabolas $y^2 = 4ax$ and $x^2 = 4ay$.

2. If $A=\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $B=\begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$ P.T. $(AB)^{-1}=B^{-1}A^{-1}$

3. Integrate w.r.t.x: i) $\cos 7x \cdot \cos 3x$ ii) $\sin 6x \cdot \sin 4x$

4. The angle of elevation of a cloud from a pt 'h' mts above the lake is α and the angle of depression of its reflection in the lake is $\frac{h\sin(\alpha+\beta)}{\sin(\beta-\alpha)}$

5. Prove the following: i) $\sin 3\theta = 3\sin\theta - 4\sin^3\theta$ ii) $\cos 2A = \cos^2 A - \sin^2 A$

iii) $\tan 2A = \frac{2\tan A}{1-\tan^2 A}$ iv) $\tan 3A = \frac{3\tan A - \tan^3 A}{1-3\tan^2\theta}$

6. Find $\frac{dy}{dx}$, when y is equal to (i) $\sec^{-1}(\tan 2x)$ ii) $\frac{\log \tan 5x}{e^x}$ iii) $\sqrt{x^2-1}\ .\operatorname{cosec}^{-1} x$

7. Write four important properties of matrices.

IV Write essay on any ONE

(1 x 10=10)

1. i) Solve by Cramer's rule $3x + 2y + 52 = 32$

$2x + 5y + 32 = 31$

$5x + 3y + 22 = 32$

ii) Solve for x: $\begin{vmatrix} x+2 & x+6 & x-1 \\ x+6 & x-1 & x+2 \\ x-1 & x+2 & x+6 \end{vmatrix} = 0$

iii) Prove that : $\begin{vmatrix} x & p & q \\ p & x & q \\ p & q & x \end{vmatrix}$ $q = (x-p)(x-q)(x+p+q)$

2. a) Find the maximum and minimum values of the function $4x^3-15x^2+12x+7$

b) Prove that i) $\int_0^a f(x)\,dx = \int_0^a f(a-x)\,dx$ ii) $\int_0^{2a} f(x)\,dx = \int_a^a f(x)\,dx + \int_0^a f(2a-x)\,dy$

c) If $A=30^0$, prove that i) $\cos 3A = 4\cos^3 A - 3\cos A$

ii) $\tan 2A = \frac{2\tan A}{1-\tan^2 A}$ iii) $\sin 3A = 3\sin A - 4\sin^3 A$