OBJECTIVE QUESTIONS Mathematics I(EAS 103) Dr Anita Taneja

Q.1 Answer the followings:

i.). The rank of the diagonal Matrix (1, 1, 1) is .....

ii.). If $\begin{bmatrix} 3 & -1 \\ 2 & 5 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}=\begin{bmatrix} 4 \\ -3 \end{bmatrix}$, then x & y are .....

iii.) If two eigen values of a 3 x 3 Matrix A are -1 & 2 and $|A|=4$, then the 3rd eigen value is

a) 4 b) -1 c) -2 d) 2

iv.) If a square Matrix A has an eigen value λ, then the eigen value of $(kA)'$ where k is non-zero scalar is

a) λ/k b) $k\lambda$ c) k/λ d) λ

v) If $A=\begin{bmatrix} -1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 0 & -2 \end{bmatrix}$ then eigen values of $A^3+5A+8I$ are

a) -1, -2, 3 b) -5, -10, 15 c) 8, 8, 8 d) 2, -10, 50

vi). If A is Unitary Matrix , then

a) $A.A=I$ b) $A'.A=I$ c) $A^{-1}.A=I$ d) $A.A^{\theta}=I$

vii) A Matrix 'P' is Idempotent if .....

viii) Eigen values of a Hermitian Matrix are

a) 0 b) -ve c) Real d) Imaginary

ix) If $A=\begin{bmatrix} 1 & 2 & 3 \\ 0 & -2 & 6 \\ 0 & 0 & -3 \end{bmatrix}$, then the value of A^3+4A^2+A-6I is

a) 1 b) 0 c) -2 d) -3

x) For what values of 'k' the system of equations $3x-y+4z=3$, $x+2y-3z=-2$ & $6x+5y+kz=-3$ has unique solution

a) any real b) -5 c) any real other than -5 d) 0

xi) If x = r cos θ, y = r sin θ , z = z find the value of $\frac{\partial(x,y,z)}{\partial(r,\theta,z)}$ .....

xii) The period T of a simple pendulum is $T=2\pi\sqrt{\frac{l}{g}}$ then the max. error in T due to possible errors upto 1% in l and 2% in g is

a) 1.5 b) 2 c) 1 d) None of these

xiii) The min.value of $x^2+y^2+6x+12$ is

a) 2 b) -6 c) 3 d) 9

xiv) If p= $s\tan\theta$, $q=s\cot\theta$ then $\left(\frac{\partial s}{\partial p}\right)_q$ is

a) $\cot\theta$ b) $\cos^2\theta$ c) $\frac{1}{\tan\theta+s\sec^2\theta}$ d) $\frac{1}{2}\cot\theta$

xv) If $u=\sin^{-1}\frac{x}{y}+\tan^{-1}\frac{x}{y}$, then the value of xu_x+yu_y is

a) 1 b) 0 c) 2 u d) None of these

xvi) If the functions u, v, w of three independent variables x, y, z are not independent then $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ is

a) 1 b) xyz c) uvw d) 0

xvii) If $u=\log\frac{x^2+y^2}{x^2-y^2}$ then $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}$ is

a) 2 b) 1 c) 0 d) u

xviii) The value of $\int_0^1\int_0^x e^x dxdy$ is

a) e-2 b) 0 c) 1 d) x

xix) The value of $\Gamma\left(\frac{1}{2}\right)$ is

a) $\sqrt{\frac{2}{\pi}}$ b) 0 c) $\sqrt{\frac{\pi}{2}}$ d) $\sqrt{\pi}$

xx) The value of $\int_0^{\pi/2}\cos^5\theta d\theta$ is

a) 0 b) 1 c) $\frac{4}{15}$ d) $\frac{8}{15}$

xxi) The unit vector normal to the surface $x^2+3y^2+2z^2=6$ at $(2,0,1)$ is

a) $4\hat{i}+4\hat{k}$ b) $\hat{i}+\hat{k}$ c) $\frac{\hat{i}+\hat{k}}{\sqrt{2}}$ d) $\frac{\hat{i}+\hat{j}+\hat{k}}{\sqrt{3}}$

xxii) The max. value of the directional derivative of $\phi=x^2-2y^2+4z^2$ at $(1,1,-1)$ is

a) $\sqrt{\frac{7}{3}}$ b) 84 c) $6.\sqrt{\frac{7}{3}}$ d) $3.\sqrt{\frac{3}{7}}$

xxiii) The value of λ so that the vector $\vec{u}=(x+3y)\hat{i}+(y-2z)\hat{j}+(x+\lambda z)\hat{k}$ is a solenoidal vector, is

a) -1 b) -2 c) 1 d) 2

xxiv) The vector defined by $\vec{V} = e^x \sin y\hat{i} + e^x \cos y\hat{j}$ is

a) Rotational b) Irrotational c) Solenoidal d) None of these

xxv) Let $\vec{A} = x^2\hat{i} + xye^x\hat{j} + \sin z\hat{k}$ then $\nabla.(\nabla X\vec{A})$ is equal to

a) $x + \cos z$ b) 0 c) e^x d) $e^z + \cos z$

xxvi) The value of the line integral $\int_c (y^2dx + x^2dy)$ where c is the boundary of the square $-1 \le x \le 1, -1 \le y \le 1$ is

a) 2(x+y) b) 4 c) 1 d) 0

xxvii) If $f(x,y,z) = 0$, then $\frac{\partial x}{\partial y}\frac{\partial y}{\partial z}\frac{\partial z}{\partial x}$ is equal to _____.

xxviii) What is the nth differential coefficient of e^{ax} ?

(a) e^{ax} (b) $a^n e^{ax}$ (c)n e^{-ax} (d)$a^{n-1}e^{ax}$.

xxix) The point of inflexion is the point where the curve crosses the _____.

xxx) The value of $\Gamma\left(-\frac{1}{2}\right)$ is

a) $-2\sqrt{\pi}$ b) 0 c) $\sqrt{\frac{\pi}{2}}$ d) $\sqrt{\pi}$

ANSWERS

i) 3 ii) 1, -1 iii) c iv) b v) d vi) d vii) $P^2 = P$ viii) c ix) b x) c xi) r xii) a xiii) c xiv) d xv) b xvi) d xvii) c xviii) c xix) d xx) d xxi) c xxii) c xxiii) b xxiv) b xxv) b xxvi) d xxvii) -1 xxviii) b xxix) tangent xxx) a