Q1. Let $A = [a_{ij}]_{m\times n}$ and $B = [b_{ij}]_{k\times p}$. What is the condition on m, n, k and p, so that the matrix A and B are conformable for $A + B$ and $A - B$?

(a) $m = n, k = p$ (b) $m = k, n = p$ (c) $m = p, n = k$ (d) for any m, n, k and p.

Q2. The rank of the matrix $A = \begin{bmatrix} 5 & 5 & 5 \\ 6 & 6 & 6 \\ 7 & 7 & 7 \end{bmatrix}$ is

(a) 1 (b) 2 (c) 3 (d) none of these

Q3. For a non-singular matrix A of order 3, $\det \lambda A\ (= |\lambda A|)$ is equal to

(a) $\lambda|A|$ (b) $\lambda^3|A|$ (c) $\frac{|A|}{\lambda^3}$ (d) none of these

Q4. Which of the following matrices is a skew-symmetric matrix?

(a) $\begin{bmatrix} 1 & -5 & 2 \\ -5 & 2 & 5 \\ -2 & 5 & 3 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 2 & 3 \\ -2 & 0 & -6 \\ -3 & 6 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 3 & 5 \\ 0 & 5 & 6 \\ 0 & 0 & 2 \end{bmatrix}$ (d) $\begin{bmatrix} 5 & -2 & 3 \\ -2 & 2 & 4 \\ 3 & 4 & 8 \end{bmatrix}$

Q5. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 8 \\ 12 & 16 \end{bmatrix}$ be two matrices then $4A + B$ equal to

(a) $8A$ (b) 4A (c) B^2 (d) none of these

Q6. Which of the following set of vectors is linearly dependent?

(a) (1,2), (2,4) (b) (1,2), (0,4) (c) (0,2), (2,0) (d) none of these

Q7. Let A be a non-singular matrix of order 3 and $\det A = 5$, then $\det adj\ A$ is

(a) 5 (b) 10 (c) 15 (d)25

Q8. The eigen values of the matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 3 \end{bmatrix}$ are

(a) 1,2,1 (b)1,2,3 (c) 1,1,3 (d) 1,1,6

Q9. The eigen vector of the matrix $A = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$, corresponding to eigen value 5 is

(a) $[1 \quad -1]^T$ (b) $[2 \quad -1]^T$ (c) $[1 \quad -2]^T$ (d) $[1 \quad 1]^T$

Q10. Let A be a matrix of order 3 whose eigen values are 1, -1 and 2 then the trace of the matrix $B = A + A^2 - I$ is

(a) 2 (b) 6 (c) 4 (d) 5

Q11. Let A be a matrix of order 3 whose two eigen values are 3, 2 and the trace of the matrix A is 6 then the third eigen value of A is

(a) 6 (b) -1 (c)1 (d) 4

Q12. Let $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & -5 \end{bmatrix}$, then the eigen values of A^2 are.

(a) 4,9,25 (b) 1,9,25 (c) 4,2,-5 (d) 2,3, -5

Q13. Let $A = \begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}$ be a matrix , then by Cayley Hamilton theorem the expression for A^{-1} is

(a) $\frac{1}{10}(A - 3I)$ (b) $\frac{1}{10}(A - 5I)$ (c) $\frac{-1}{10}(A - 5I)$ (d) $\frac{-1}{10}(A - 3I)$

Q14. The value of $\frac{dy}{dx}$, where y= $2\sqrt{x} - \frac{1}{2\sqrt{x}}$ is :

a) $\frac{1}{\sqrt{x}} + \frac{1}{4x\sqrt{x}}$ b) $\frac{4x-1}{4x\sqrt{x}}$ c) $x + \frac{1}{x\sqrt{x}}$ d) $\frac{4}{\sqrt{x}} + \frac{1}{x\sqrt{x}}$

Q15. The value of $\frac{dy}{dx}$ at x=0 , where y= $\ln(\sec x + \tan x)$ is :

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

Q16. If 2x + 3y = cosx, then $\frac{dy}{dx}$ is.

a) (-sinx+2)/3 b) (cosx-2)/3 c) (sinx-2)/3 d) - (sinx+2)/3

Q17. If $3x^2 - 2xy + 5y^2 = 1$ then $\frac{dy}{dx}$ is

a) $\frac{3x-y}{x-5y}$ b) $\frac{3x+y}{x-5y}$ c) $\frac{y-3x}{x-5y}$ d) $\frac{3x-y}{x+5y}$

Q18. If $x = \cos^3\theta$ and $y = \sin^3\theta$ then $\frac{dy}{dx}$ is

a) $\cot\theta$ b) $\tan\theta$ c) $-\cot\theta$ d) $-\tan\theta$

Q19. If $x = \frac{1}{1-t}$ and $y = 1 + \ln(1-t);\ (t < 1)$ then $\frac{dy}{dx}$ is

a) $\frac{1}{t}$ b) $\frac{1}{1-t}$ c) $t - 1$ d) $\frac{1}{1+t}$

Q20. If $y = 2^{\sin x}$ then $\frac{dy}{dx}$ is

a) $2^{\sin x}\log 2$ b) $2^{\sin x}$ c) 0 d) $2^{\sin x}\cos x$

Q21. $\int_0^a \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a-x}}dx$ is equal to :

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

Q22. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x\,dx =$

a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$ c) π d) 0

Q23. $\int \frac{1}{ax+b}dx$ is equal to

a) log (ax+b) +c b) $\frac{\log(ax+b)}{a}$ +c c) $\log(ax+b)^2 + c$ d) None of these

Q24. $\int \frac{e^x + xe^x}{\cos^2(xe^x)}dx$ is equal to :

a) $\log|x + xe^x| + c$ b) $\sec(xe^x) + c$ c) $\tan(xe^x) + c$ d) $\cot(xe^x) + c$

Q25. $\int \cot x \log(\sin x)\,dx$ is equal to :

a) $\frac{1}{2}(\log(\sin x))^2 + c$ b) $(\log(\sin x))^2 + c$ c) $\frac{1}{2}(\log(\sin x))^2$ d) $\frac{1}{2}(\log(\sin x)) + c$