Name..Roll No......... Reg.No...SET-A

Max. Time: 25 Min. No negative marking.

Q.1 If $f(x)=\tan^2 x,\ -2\le x\le 2$ then $b_6=?$

(a)1 (b)0 (c)-1 (d)None of these.

Q.2 If $f(x)=\sin^3 x,\ -3\le x\le 3$ then $a_4=?$

(a)1 (b)-1 (c)0 (d)None of these.

Q.3 If $f(x)=|\sin x|,\ -\pi\le x\le \pi$ then $a_0=?$

(a)1 (b) $2/\pi$ (c)0 (d) $4/\pi$.

Q.4 If $f(x)=x^2,\ -3\le x\le 3$ then $a_0=?$

(a)-3 (b)-6 (c)3 (d)6.

Q.5 $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\frac{1}{7^2}+......................=?$

(a) $\pi^2/8$ (b) $\pi^2/6$ (c) $\pi^2/12$ (d) $\pi^2/24$.

Q.6 If $f(x)=x^3,\ -4\le x\le 4$ then $a_0=?$

(a)1 (b)0 (c)-1 (d)None of these.

Q.7 If $f(x)=e^{4x},\ 0\le x\le 2\pi$ then $a_0=?$

(a) $[e^{8\pi}-1]/\pi$ (b) $[1-e^{8\pi}]/4\pi$

(c) $[e^{8\pi}-1]/4\pi$ (d) $[1-e^{8\pi}]/\pi$.

Q.8 If $f(x)=x-x^2,\ -\pi\le x\le \pi$ then $a_n=?$

(a) $4(-1)^{n+1}/(n)$ (b) $4(-1)^{n+1}/(n^2)$

(c) $4(-1)^n/(n^2)$ (d) $(-1)^{n+1}/(n^2)$.

Q.9 If $f(x)=e^{-x},\ 0\le x\le 2\pi$ then $a_n=?$

(a) $[1-e^{-2\pi}]/\pi(n^2-1)$ (b) $[e^{-2\pi}-1]/\pi(n^2+1)$

(c) $[e^{-2\pi}-1]/\pi(n^2-1)$ (d) $[1-e^{-2\pi}]/\pi(n^2+1)$.

Q.10 If $f(x)=x\sin x,\ 0\le x\le 2\pi$ then $a_0=?$

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

Q.11 In Fourier half range sine series in the interval $[0,l]$, Parseval's formula $\int_0^l [f(x)]^2 dx=?$

(a) $l\left[\sum_{n=1}^{\infty}(b_n^2)\right]$ (b) $l\left[\frac{a_0^2}{2}+\sum_{n=1}^{\infty}(b_n^2)\right]$

(c) $\frac{l}{2}\left[\sum_{n=1}^{\infty}(b_n^2)\right]$ (d) $\frac{l}{2}\left[\frac{a_0^2}{2}+\sum_{n=1}^{\infty}(b_n^2)\right]$.

Q.12 In Parseval's formula $\int_{-l}^{l}[f(x)]^2 dx=?$

(a) $l\left[a_0^2+\sum_{n=1}^{\infty}(a_n^2+b_n^2)\right]$

(b) $\frac{l}{2}\left[\frac{a_0^2}{2}+\sum_{n=1}^{\infty}(a_n^2+b_n^2)\right]$

(c) $\frac{l}{2}\left[a_0^2+\sum_{n=1}^{\infty}(a_n^2+b_n^2)\right]$

(d) $l\left[\frac{a_0^2}{2}+\sum_{n=1}^{\infty}(a_n^2+b_n^2)\right]$.

Q.13 In the complex form of Fourier Series, $f(x)=?$

(a) $\sum_{n=1}^{\infty}(a_n e^{-in\pi x/l})$ (b) $\sum_{n=1}^{\infty}(a_n e^{in\pi x/l})$

(c) $\sum_{n=-\infty}^{\infty}(a_n e^{-in\pi x/l})$ (d) $\sum_{n=-\infty}^{\infty}(a_n e^{in\pi x/l})$.

Q.14 In the complex form of Fourier Series in the interval $[-l,l]$, the Fourier coefficient $a_n=?$

(a) $\left[\int_{-l}^{l} f(x)e^{-in\pi x/l}dx\right]/l$ (b) $\left[\int_{0}^{l} f(x)e^{-in\pi x/l}dx\right]/2l$

(c) $\left[\int_{-l}^{l} f(x)e^{-in\pi x/l}dx\right]/2l$ (d) $\left[\int_{-l}^{l} f(x)e^{in\pi x/l}dx\right]/2l$.

Q.15 For term by term integration in an infinite series in the derivation of Parseval's formula, the infinite series should be:

(a)convergent (b)uniformly convergent

(c)absolutely convergent (d)None of these.

10	11	12	13	14	15
d	(a)	(a)	c	(c)	b
x	x	x	x	✓	✓

Max. Time: 25 Min. No negative marking.

Q.1 For term by term integration in an infinite series in the derivation of Parseval's formula, the infinite series should be:

(a)convergent (b) absolutely convergent
(c)uniformly convergent (d)None of these.

Q.2 In the complex form of Fourier Series in the interval $[-l,l]$, the Fourier coefficient $a_n = ?$

(a) $\left[\int_{-l}^{l} f(x)e^{-in\pi x/l}dx\right]/2l$ (b) $\left[\int_{0}^{l} f(x)e^{-in\pi x/l}dx\right]/2l$

(c) $\left[\int_{-l}^{l} f(x)e^{-in\pi x/l}dx\right]/l$ (d) $\left[\int_{-l}^{l} f(x)e^{in\pi x/l}dx\right]/2l$.

Q.3 In the complex form of Fourier Series, $f(x) = ?$

(a) $\sum_{n=1}^{\infty}(a_n e^{-in\pi x/l})$ (b) $\sum_{n=-\infty}^{\infty}(a_n e^{in\pi x/l})$

(c) $\sum_{n=-\infty}^{\infty}(a_n e^{-in\pi x/l})$ (d) $\sum_{n=1}^{\infty}(a_n e^{in\pi x/l})$.

Q.4 In Parseval's formula $\int_{-l}^{l}[f(x)]^2 dx = ?$

(a) $l\left[a_0^{\,2} + \sum_{n=1}^{\infty}(a_n^{\,2} + b_n^{\,2})\right]$

(b) $l\left[\frac{a_0^{\,2}}{2} + \sum_{n=1}^{\infty}(a_n^{\,2} + b_n^{\,2})\right]$

(c) $\frac{l}{2}\left[a_0^{\,2} + \sum_{n=1}^{\infty}(a_n^{\,2} + b_n^{\,2})\right]$

(d) $\frac{l}{2}\left[\frac{a_0^{\,2}}{2} + \sum_{n=1}^{\infty}(a_n^{\,2} + b_n^{\,2})\right]$.

Q.5 In Fourier half range cosine series in the interval $[0,l]$, Parseval's formula $\int_{0}^{l}[f(x)]^2 dx = ?$

(a) $l\left[a_0^{\,2} + \sum_{n=1}^{\infty}(a_n^{\,2})\right]$ (b) $l\left[\frac{a_0^{\,2}}{2} + \sum_{n=1}^{\infty}(a_n^{\,2})\right]$

(c) $\frac{l}{2}\left[a_0^{\,2} + \sum_{n=1}^{\infty}(a_n^{\,2})\right]$ (d) $\frac{l}{2}\left[\frac{a_0^{\,2}}{2} + \sum_{n=1}^{\infty}(a_n^{\,2})\right]$.

Q. No	1	2	3	4	5	6	7	8	9

Q.6 If $f(x) = x\sin x,\ 0 \le x \le 2\pi$ then $a_0 = ?$

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

Q.7 If $f(x) = \sin^2 x,\ -2 \le x \le 2$ then $b_4 = ?$

(a)1 (b)0 (c)-1 (d)None of these.

Q.8 If $f(x) = \tan^3 x,\ -3 \le x \le 3$ then $a_4 = ?$

(a)1 (b)-1 (c)0 (d)None of these.

Q.9 $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \ldots\ldots\ldots\ldots = ?$

(a) $\pi^2/8$ (b) $\pi^2/6$ (c) $\pi^2/12$ (d) $\pi^2/24$.

Q.10 If $f(x) = x^2,\ -2 \le x \le 2$ then $a_0 = ?$

(a)-4/3 (b)8/3 (c)-8/3 (d)4/3.

Q.11 If $f(x) = |\sin x|,\ -\pi \le x \le \pi$ then $a_0 = ?$

(a)1 (b) $4/\pi$ (c)0 (d) $2/\pi$.

Q.12 If $f(x) = x^5,\ -3 \le x \le 3$ then $a_0 = ?$

(a)1 (b)-1 (c)0 (d)None of these.

Q.13 If $f(x) = e^{3x},\ 0 \le x \le 2\pi$ then $a_0 = ?$

(a) $[1-e^{6\pi}]/\pi$ (b) $[1-e^{6\pi}]/3\pi$

(c) $[e^{6\pi}-1]/\pi$ (d) $[e^{6\pi}-1]/3\pi$.

Q.14 If $f(x) = x - x^2,\ -\pi \le x \le \pi$ then $a_n = ?$

(a) $4(-1)^{n+1}/(n)$ (b) $4(-1)^n/(n^2)$

(c) $4(-1)^{n+1}/(n^2)$ (d) $(-1)^{n+1}/(n^2)$.

Q.15 If $f(x) = e^{-x},\ 0 \le x \le 2\pi$ then $a_n = ?$

(a) $[1-e^{-2\pi}]/\pi(n^2-1)$ (b) $[e^{-2\pi}-1]/\pi(n^2+1)$

(c) $[e^{-2\pi}-1]/\pi(n^2-1)$ (d) $[1-e^{-2\pi}]/\pi(n^2+1)$

10	11	12	13	14	15
a	c	b	c	a	c

Paper Code: A

Registration No.:________________

PNR No::

COURSE CODE : MTH165

COURSE TITLE : MATHEMATICS FOR ENGINEERS

Time Allowed: 01 hr ***Max. Marks: 40***

Read the following instructions carefully before attempting the question paper.

1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.

2. This paper contains 40 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.

3. Do not write or mark anything on the question paper except your registration no. on the designated space.

4. Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.

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) $\log\left|x+xe^x\right|+c$ 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) $\frac{1}{2}(\log(\sin x))+c$

Q26. $\int \frac{1}{x^2+4} dx$ is equal to :

a) $\tan^{-1}(x/2)+c$ b) $\left(\frac{1}{2}\right)\tan^{-1} x$ +c c) $\tan^{-1} 2$ +c d) $\left(\frac{1}{2}\right)\tan^{-1}\left(\frac{x}{2}\right)$+c

Q27. If $f(x)=x^4$ in interval (-L, L), value of b_n in Fourier series of f(x) is

a) 1 b) $\frac{1-\pi n}{\pi}$ c) 0 d) $4L^2$

Q28. The value of $\cos(n\pi)$

a) 1 b) 0 c) $(-1)^n$ d) ½

Q29. The value of $\sin(n\pi)$

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

Q30. The function $f(x)=\sin(n\pi x).\sin(x)$ is (n is a fixed natural number)
a) odd function b) even function c) cannot say d) none of these

Q31. If f(x)=x sinx, $0<x<2\pi$ and let $f(x)=\frac{a_0}{2}+\sum_{n=1}^{\infty} a_n \cos nx+\sum_{n=1}^{\infty} b_n \sin nx$ be its Fourier series expansion, then value of a_0 is.

a) 2 b) π c) -2 d) $-\pi$

Q32. Which of the following condition is necessary for Fourier series expansion of f(x) in the internal (c, c+2l)
a) f(x) should be continuous in (c,c'+2l)
b) f(x) should be periodic
c) f(x) should be even
d) f(x) should be odd

Q33. $\int_a^{a+2\pi} \cos nx \, dx$ is equal to
a) 1 b) π c) $-\pi$ d) 0

Q34. If $f(x)=\frac{a_0}{2}+\sum_{n=1}^{\infty} a_n \cos nx+\sum_{n=1}^{\infty} b_n \sin nx$ be the Fourier series expansion in the interval $a<x<a+2\pi$ then. a_0 is
a) $\frac{1}{\pi}\int_a^{a+2\pi} f(x)dx$
b. $\frac{1}{\pi}\int_a^{a+2\pi} f(x)\sin nx \, dx$
c. $\frac{1}{\pi}\int_a^{a+2\pi} f(x)\; nx\, dx$
d. $\frac{1}{\pi}\int_a^{a+2\pi} f(x)\cos nx \, dx$

Q35. Express $f(x)=x-x^2$ as half range sine series in the internal $0<x<1$, if $b_n=\frac{4[1-(-1)^n]}{n^3\pi^3}$
a) $f(x)=\frac{8}{\pi^2}(\frac{1}{1^3}\sin\pi x+\frac{1}{3^3}\sin 3\pi x+\frac{1}{5^3}\sin 5\pi x \ldots\ldots)$
b) $f(x)=\frac{1}{\pi}(\sin\frac{\pi x}{2}+\frac{1}{2}\sin\frac{2\pi x}{2}+\frac{1}{3}\sin\frac{2\pi x}{2}+\frac{1}{4}\sin\frac{2\pi x}{2}+\cdots\ldots)$
c) $f(x)=\frac{2}{\pi}(\sin\frac{\pi x}{2}+\frac{1}{2}\sin\frac{2\pi x}{2}+\frac{1}{3}\sin\frac{3\pi x}{2}+\frac{1}{4}\sin\frac{4\pi x}{2}+\cdots\ldots)$
d) $f(x)=\frac{4}{\pi}(\sin\frac{\pi x}{2}-\frac{1}{2}\sin\frac{2\pi x}{2}+\frac{1}{3}\sin\frac{2\pi x}{2}-\frac{1}{4}\sin\frac{2\pi x}{2}+\cdots\ldots)$

Q36. If $f(x)=x^2$, defined in $-4<x<4$, then which of the following will be true for Fourier expansion of f(x)
a) $a_o=0$, $a_n=0$ b) $a_0=0$ c) $a_o=0$, $b_n=0$ d) $b_n=0$

Q37. The function $f(x)=\cos(n\pi x).\sin(x)$ is (where n is a fixed natural number)
a) odd function
b) even function
c) cannot say
d) none of these

Q38. Let f(x)=x , $-\pi < x < \pi$ and f(x)=$\frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$ be its Fourier series expansion. Then the value of a_0 is

a) 0 b) π c) -2 d) $-\pi$

Q39. Let f(x)=x^2 , $-\pi < x < \pi$ and f(x)=$\frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$ be the Fourier series expansion then the value of b_n is

a) 0 b) π c) -2 d) $-\pi$

Q40. If f(x) = $\sum_{n=1}^{\infty} b_n$ sin nx be defined in the interval $(0,\pi)$, then the value of b_n is

(a) $\int_0^{\pi} f(x) \sin nx\, dx$

(b) $\int_0^{\pi} f(x) \cos nx\, dx$

(c) $\frac{2}{\pi} \int_0^{\pi} f(x) \sin nx\, dx$

(d) none of these

-- End of Question Paper --

Paper Code: A

Registration No.:_______________

PNR No::

COURSE CODE : MTH165
COURSE NAME : MATHEMATICS FOR ENGINEERS

Max.Marks: 70

Time Allowed: 02:00 hrs

Read the following instructions carefully before attempting the question paper.

1. Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same.

2. This question paper contains 70 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.

3. Do not write or mark anything on the question paper except your registration no. on the designated space.

4. Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.

Q1. The determinant $\begin{vmatrix} a & b & c \\ a-b & b-c & c-a \\ -b & -c & -a \end{vmatrix}$ is equal to

a. abc b. $-abc$ c. Zero d. $a^2b^2c^2$

Q2. Choose the correct option. The inverse of the matrix A= $\begin{pmatrix} 0 & 1 & -2 \\ -1 & 0 & 1 \\ 2 & -1 & 0 \end{pmatrix}$ does not exist because

a. A *is singular* b. A *is symmetric* c. A *has three non zero rows* d. A has rank 3.

Q3. Let A be a square matrix of some order. Then the matrix P = $(A - A^T)$ is

a. *Always skew symmetric* b. *always symmetric*
c. *symmetric for some A* d. None of these

Q4. The following system of linear equations

$$2x + 3y + 5z = 0$$
$$7x + 3y - 2z = 0 \text{ has}$$

a. *no solution* b. a unique solution c. *many solutions* d. *only two solutions*

Q5. The product of the eigen values of the matrix $\begin{pmatrix} 2 & 0 & 0 & 0 \\ 1 & 3 & 0 & 0 \\ 3 & 5 & 3 & 0 \\ 2 & 2 & 4 & 1 \end{pmatrix}$ is equal to

a. 18 b. 9 c. 15 d. 12

Q6. If A and B are invertible matrices of the same order then $(AB)^{-1}$ is equal to

a) $A^{-1}B^{-1}$ b) $A^{-1}B$ c) AB^{-1} d) $B^{-1}A^{-1}$

Q7. Rank of a null matrix of order 3 is

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

Q8. If two eigen values of the matrix A = $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ are 3 and 15 then the third eigen value is

a) 0 b) 7 c) 4 d) 8

Q9. If a, b, c are the eigen values of the matrix A then A^3 has the eigen values

a) a, b, c b) a^3, b^3, c^3 c) ab, bc, ca d) $\frac{1}{a^3}, \frac{1}{b^3}, \frac{1}{c^3}$

Q10. Let A be 3×3 matrix and $|A| = -3$ then $|4A| =$

a) -3 b) 3 c) -12 d) -192

Q11. Rank of the matrix A = $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$ is

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

Q12. If the eigen values of the matrix A are 1, 2 and 4 then the value of |A| is

a) 10 b) 7 c) 8 d) 30

Q13. The slope of the curve $y = x^2 - 5x + 6$ is zero at which of the following values of x

a) 2 b) 3/2 c) 5/2 d) 7

Q14. Let $f(x) = [x], 0 \le x \le 3$. Then $f'(x)$ exists at

a) all points b) all points except x=0 c) all points except x=1, 2, 3 D) none of these

Q15. If the function $f(x)$ is such that it's first derivatives $f'(x)$ changes sign from $+ve$ to $-ve$ as x passes through the point c. Choose the appropriate option from below.

$a)$ c is a point of maximum
b) c is a point of minimum
$c)$ c is a point of inflexion
$d)$ can not be concluded

Q16.

Let $f(x) = x^2 + \frac{5}{2}$, $x \in \mathbb{R}$. Then f has minimum value

$a)$ only at 5/2 b) $-\frac{5}{2}$ c) at $x = 0$ d) none of these

Q17. Find $\frac{dy}{dx}$ at the point (-1,-1) if $x^2 - y^2 = \pi^2$.

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

Q18. If $y = t^2$, $x = t$ then $\frac{d^2y}{dx^2}$ equals to

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

Q19. For the function $f(x) = x^3 - 6$, $x = 0$ is a

$a)$ point of minimum b) point of maximum $c)$ point of inflexion d) none of these

Q20. Differentiate sin(ax+b) w.r.t.x

a) cos (ax+b) b) a cos(ax+b) c) cos ax d) none of these

Q21. Find the local maximum value of f(x) = $-x^3 + 12x^2 - 5$

a) 250 b) 251 c) 252 d) 253

Q22.Q. Differentiate $\tan^{-1}x$ w.r.t. x

a) $1+x^2$ b) $\frac{1}{1+x^2}$ c) $1-x^2$ d) $\frac{1}{1-x^2}$

Q23. Find $\frac{dy}{dx}$ in $2x + 3y = \sin x$

a) $\frac{\cos x+2}{3}$ b) $\frac{\cos x+3}{2}$ c) $\frac{\cos x-2}{3}$ d) none of these

Q24. Find $\frac{dy}{dx}$ if $x = at^2$, $y = 2at$

a) 2at b) t c) $\frac{1}{2at}$ d) $\frac{1}{t}$

Q25. If $\frac{df(x)}{dx} = 4x^3 - \frac{3}{x^4}$ such that f(1) = 0 then f(x)=

a) $x^4 + \frac{1}{x^3} - 2$ b) $x^4 + \frac{1}{x^3} + 2$ c) $x^4 + \frac{1}{x^3} - 1$ d) $x^4 + \frac{1}{x^3} + 1$

Q26. $\int_0^1 \frac{\tan^{-1} x}{1+x^2} dx =$

a) $\frac{\pi^2}{16}$ b) $\frac{\pi^2}{8}$ c) $\frac{\pi^2}{24}$ d) $\frac{\pi^2}{32}$

Q27. The integral $\int_{-1}^{1} \sin^5 x \cos^2 x \, dx$ has the value

a) $zero$ b) one c) -1/2 d) $-11/17$

Q28. $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx =$

a) $\tan(e^x)+C$ b) $\cot(e^x)+C$ c) $\tan(xe^x)+C$ d) $\cot(xe^x)+C$

Q29. The integral $\int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}} \frac{dx}{\sqrt{1-x^2}}$ is equal to

a) $\pi/12$ b) $-\pi/12$ c) $\pi/2$ d) none of these

Q30. The integral $\int_0^{\pi} \cos 6x \sqrt{1+\sin 6x} \, dx$ has the value

a) 1/2 b) zero c) 1 d) $-\sqrt{2}$

Q31. The integral $\int_{-1}^{1} 5x^4\sqrt{x^5+1}dx$ has the value

a) $\frac{1}{4\sqrt{2}}$ b) zero c) $\frac{4\sqrt{2}}{3}$ d) $-\frac{4\sqrt{2}}{3}$

Q32. $\int \sin x \, dx$

a) cos x + c b) – cos x + c c) cosec x + c d) sec x+ c

Q33. $\int e^{2x+3} dx$

a) e^{2x+3}+c b) e^{2x} + c c) $2e^{2x+3}$ + c d) 1/2 (e^{2x+3}) + c

Q34. Solve $\int \frac{\sin(\log x)}{x} dx$

a) $-\cos(\log x) + c$ b) $\sin(\log x) + c$ c) $-\cos x + c$ d) none of these

Q35. $\int xe^x dx =$

a) $xe^x + c$ b) $e^x + c$ c) $xe^x - e^x + c$ d) $xe^x + e^x + c$

Q36. If $f(-x) = -f(x)$ then $\int_{-a}^{a} f(x)dx =$

a) $2\int_0^a f(x)dx$ b) 0 c) 1 d) none of these

Q37. The value of the limit $\lim_{(x,y)\to(0,0)} \left(\frac{xy}{\sqrt{x^2+y^2}}\right)$ equals to

a) Does not exist b) ½ c) zero d) ¼

Q38. If $f(x,y) = x^2 + y^2$, the value of $(f_x + f_y)_{(1,1)}$ equals to

a) 0 b) 4 c) 2 d) doesn't exist

Q39. The degree of the homogeneous function $z = \left(\frac{x^3+y^3}{x^2+y^2}\right)$ is

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

Q40. If $w = xyz$ where $x = e^t, y = \cos t, z = t^3$, the value of $\left(\frac{dw}{dt}\right)_{t=0}$ equals to

a) 3e b) e c) 1/e d) 0

Q41. The value of the limit $\lim_{(x,y)\to(0,0)} \left(\frac{x-y}{\sqrt{x^2+xy}}\right)$ equals to

a) Does not exist b) ½ c) ¼ d) zero

Q42. If $f(x,y) = x^2 + y^2$, the value of $(f_x + f_y)_{(-1,-1)}$ equals to

a) 0 b) -4 c) -2 d) doesn't exist

Q43. The critical points of $f(x,y) = 4x^2 + y^2 - 2x - 2y$ are

a) (1/4, 0) b) (4,-2) c) (4,1) d) (1/4, 1)

Q44. Find the limit of $\lim_{(x,y)\to(1,1)} x^2 + y^2 - 1$

a) 1 b) 2 c) 3 d) does not exist

Q45. Let f(x,y) be a continuous function and possess first and second order partial derivatives at a point P(a,b). If P is a critical point then it is relative minimum if

a) $rt - s^2 > 0$ and $r>0$ b) $rt - s^2 > 0$ and $r<0$ c) $rt - s^2 < 0$ and $r>0$ d) $rt - s^2 = 0$

Q46. Find the total differential of $z = \tan^{-1}(x/y)$, $(x,y)\neq(0,0)$

a) $\frac{1}{x^2+y^2}(y\,dx - x\,dy)$ b) $\frac{1}{x^2-y^2}(y\,dx + x\,dy)$ c) $\frac{1}{x^2-y^2}(y\,dx - x\,dy)$ d) $\frac{1}{x^2+y^2}(y\,dx + x\,dy)$

Q47. Find $\frac{\partial z}{\partial x}$ if $z = e^x \sin y + x\cos y$

a) $e^x \cos y + x \sin y$ b) $e^x \cos y - x\sin y$ c) $e^x \sin y + \cos y$ d) none of these

Q48. If $z = e^x \sin y + e^y \cos x$ then find $\frac{\partial^2 z}{\partial y^2}$

a) $-e^x \sin y + e^y \cos x$ b) $e^x \cos y + e^y \cos x$ c) $e^x \sin y + e^y \cos x$ d) none of these

Q49. Area using polar coordinates in double integrals is given by

a) $\iint r\,dr d\theta$ b) $\iint dr d\theta$ c) $\iint r^2\,dr d\theta$ d) none of these

Q50. To evaluate $\iiint_T dxdydz$ where T is the region bounded by $x^2+y^2+z^2 \leq 1$

a) Area b) surface c) Volume d) None

Q51. The value of the double integral $\int_0^1 \int_0^y dxdy$

a) 3 / 4 b) 1/ 3 c) 1 / 2 d) 2/ 3

Q52. If we substitute $x = r\cos\theta,\ y = r\sin\theta$ the double integral $\int_{-2}^{2}\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} dydx$ takes the form

a) $\int_0^4 \int_0^{2\pi} d\theta dr$ b) $\int_0^2 \int_0^{2\pi} r d\theta dr$ c) $\int_0^2 \int_0^{\pi} d\theta dr$ d) $\int_0^4 \int_0^{2\pi} r d\theta dr$

Q53. If we make the change of order of integration to evaluate $\int_{x=0}^{1}\int_{y=0}^{x^2} dxdy$ what will be limit for x?

a) $\sqrt{2y}$ to 1 b) $\sqrt{2y}$ to 2 c) $\sqrt{y}$ to 1 d) $\sqrt{y}$ to 4

Q54. The area bounded by the curves $x = y^2$ and $x + y - 2 = 0$ is given by $\int_{y=c}^{y=d}\int_{x=f(y)}^{x=g(y)} dxdy$, (f(y)<(g(y) and c < d). Then d equals to

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

Q55. If R^* is the region corresponding to R is r-θ plane then $\iint_R f(x,y)dx\,dy$=

a) $\iint_{R^*} f(r\cos\theta, r\sin\theta) r\,dr\,d\theta$ b) $\iint_{R^*} f(r\cos\theta, r\sin\theta)\,dr\,d\theta$
c) $\iint_{R^*} f(r\sin\theta, r\cos\theta)\,dr\,d\theta$ d) none of these

Q56. Calculate the volume of the solid bounded by the planes x=0, y=0, x+y+z = a and z = 0

a) $\frac{a^3}{12}$ b) $\frac{a^3}{4}$ c) $\frac{a^3}{2}$ d) $\frac{a^3}{6}$

Q57. If the Cartesian coordinates are changed to cylindrical coordinates, then

a) x = r cos θ , y = r sin θ , z = z b) x = r sin θ , y = r cos θ , z = 1
c) x = r cos θ , y = r sin θ , z = 0 d) none of these

Q58. If the Cartesian coordinates are changed to cylindrical coordinates, then

a) x = r cos θ , y = r sin θ , z = z
b) x = r sin θ , y = r cos θ , z = 1
c) x = r cos θ , y = r sin θ , z = 0
d) none of these

Q59. Evaluate $\int_{x=3}^{4}\int_{y=1}^{2} xy\, dy\, dx$

a) 21
b) 21/4
c) 4
d) 0

Q60. Change the order of integration in $\int_0^1\int_0^{\sqrt{1-x^2}}(x+y)dy\,dx$

a) $\int_0^{-1}\int_0^{\sqrt{1-y^2}}(x+y)dy\,dx$
b) $\int_0^{-1}\int_0^{\sqrt{1-x^2}}(x+y)dy\,dx$
c) $\int_0^1\int_0^{\sqrt{1-x^2}}(x+y)dx\,dy$
d) $\int_0^1\int_0^{\sqrt{1-y^2}}(x+y)dx\,dy$

Q61. The value of the double integral $\int_0^1\int_0^y dxdy$

a) 3 / 4
b) 1/ 3
c) 1 / 2
d) 2/ 3

Q62. To evaluate double integration $\iint_R f(x,y)dxdy$ if we change the variables form (x,y) to (u,v) using the transformation $x+y=u$ and $x-y=v$ then the value of the Jacobian $J=\frac{\delta(x,y)}{\delta(u,v)}$ equals to

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

Q63. The area of the region bounded by the curves $y=x^2$ and $y=4-x^2$ is given by $\int_{x=a}^{x=b}\int_{y=f(x)}^{y=g(x)}dydx$, (a<b).

Then f(x)=

(a) 4
(b) x^2
(c) 0
(d) $4-x^2$

Q64. To evaluate $\iiint_T dxdydz$ where T is the region bounded by x+y+z ≤ 1; 0 ≤ x ≤ c, we integrate $\int_{x=0}^{C}\int_{y=0}^{1-x}\int_{z=0}^{1-x-y}dxdydz$. Here what is the value of C ?

a) 1 – x
b) 1 – y
c) 1
d) none of these

Q65. To evaluate double integration $\iint_R f(x,y,z)dxdydz$ if we change the variables form (x, y, z) to (r, θ, φ) using the transformation $x=r\sin\theta\cos\varphi$, $y=r\sin\theta\sin\varphi$ and $z=r\cos\theta$ then the value of the Jacobian $J=\frac{\delta(x,y,z)}{\delta(r,\theta,\varphi)}$ equals to

a) $-r^2\sin\theta$
b) $r^2\sin\theta$
c) r sin φ
d) –r sin φ

Q66. The volume of the solid which is below the plane z=2x+3 and above the x-y plane and bounded by $y^2=x, x=0$ and $x=2$ is given by $\int_{y=c}^{y=d}\int_{x=f(y)}^{x=g(y)}(2x+3)dxdy$. Then

a) $f(y)=x$
b) $f(y)=0$
c) $f(y)=y^2$
d) $f(y)=2$

Q67. Find the dual of the following LPP

Min Z = $10x_1 + 20x_2$
subject to the constraints
$2x_1 + 4x_2 \geq 8$
$6x_1 + 8x_2 \geq 7$
$x_1 \geq 0$, $x_2 \geq 0$

a) Max W = $8y_1 + 7y_2$
subject to the constraints
$2y_1 + 6y_2 \leq 10$
$4y_1 + 8y_2 \leq 20$

$y_1 \geq 0$, $y_2 \geq 0$

b) Max $Z = 10x_1 + 20x_2$

subject to the constraints

$2x_1 + 6x_2 \leq 8$

$4x_1 + 8x_2 \leq 7$

$x_1 \geq 0$, $x_2 \geq 0$

c) Min $W = 10y_1 + 20y_2$

subject to the constraints

$2y_1 + 6y_2 \geq 8$

$4y_1 + 8y_2 \geq 7$

$y_1 \geq 0$, $y_2 \geq 0$

d) none of these

Q68. Find the minimum value in

Min $Z = 3x + 5y$

subject to the constraints

$x + y = 6$

$x \leq 4$, $y \leq 5$

$x \geq 0$, $y \geq 0$

a) 22

b) 23

c) 24

d) 25

Q69. At which corner point the following LPP has minimum value?

Min $Z = 3x + 5y$

subject to the constraints

$x + y = 6$

$x \leq 4$, $y \leq 5$

$x \geq 0$, $y \geq 0$

a) (4,2)

b) (1,5)

c) (1,4)

d) (0,0)

Q70. The coefficients of slack variables in linear objective function is

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

-- End of Question Paper --

Q10. Dual of LPP Max $Z=10x_1+13x_2+19x_3$, s.t. $6x_1+5x_2+3x_3 \leq 26$, $4x_1+2x_2+5x_3 \leq 7$; $x_1,x_2,x_3 \geq 0$ is

a) Min. $W=26y_1+7y_2$; s.t. $6y_1+4y_2 \geq 10$, $5y_1+2y_2 \geq 13$, $3y_1+5y_2 \geq 19$; $y_1,y_2,y_3 \geq 0$
b) Min. $W=26y_1+7y_2$; s.t. $6y_1+4y_2 \leq 10$, $5y_1+2y_2 \leq 13$, $3y_1+5y_2 \leq 19$; $y_1,y_2,y_3 \geq 0$
c) Min. $W=26y_1+7y_2$; s.t. $6y_1+4y_2 = 10$, $5y_1+2y_2 = 13$, $3y_1+5y_2 = 19$; $y_1,y_2,y_3 \geq 0$
d) None of these

Q11. The polar form of $\iint_R e^{(x^2+y^2)}dxdy$, where $R: x^2+y^2 \geq 4,\ x^2+y^2 \leq 25,\ y \geq x \geq 0$ is

(a) $\int_0^{\pi}\int_4^{25} e^{r^2} r\,dr\,d\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_2^{5} e^{r^2} r\,dr\,d\theta$ (c) $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\int_2^{5} e^{r^2} r\,dr\,d\theta$ (d) $\int_0^{\frac{\pi}{2}}\int_2^{5} e^{r^2} r\,dr\,d\theta$

Q12. If $u=u(x,y), v=v(x,y)$, then $\left(\frac{\partial(u,v)}{\partial(x,y)}\right)\left(\frac{\partial(x,y)}{\partial(u,v)}\right)$ is equal to

(a) 1 (b) r (c) r^2 (d) - 1

Q13. After changing to cylindrical polar co-ordinates the integral $\iiint_R dx\,dy\,dz$ where $R: x^2+y^2 \leq 1, 0 \leq z \leq 1$ is equal to

a) $\int_{-1}^{1}\int_0^{2\pi}\int_0^{1} dr d\theta dz$ b) $\int_{0}^{1}\int_0^{2\pi}\int_0^{1} dr d\theta dz$ c) $\int_{0}^{1}\int_0^{2\pi}\int_0^{1} r dr d\theta dz$ d) $\int_{0}^{1}\int_0^{\pi}\int_0^{1} r dr d\theta dz$

Q14. After changing to cylindrical polar co-ordinates the integral $\iiint_R dx\,dy\,dz$ where $R: x^2+y^2 \leq 4, 0 \leq z \leq 1$ is equal to

a) $\int_{-2}^{2}\int_0^{2\pi}\int_0^{1} dr d\theta dz$ b) $\int_{0}^{1}\int_0^{2\pi}\int_0^{1} dr d\theta dz$ c) $\int_{0}^{2}\int_0^{2\pi}\int_0^{1} r dr d\theta dz$ d) $\int_{0}^{1}\int_0^{2\pi}\int_0^{2} dr d\theta dz$

Q15. The limits of the region bounded by $y^2 = 4x$ and $x = \frac{1}{4}$ are

(a) $0 \leq x \leq \frac{1}{4}$ & $-2\sqrt{x} \leq y \leq 3\sqrt{x}$ (b) $0 \leq x \leq \frac{1}{4}$ & $-2\sqrt{x} \leq y \leq 2\sqrt{x}$

(c) $-\frac{1}{4} \leq x \leq \frac{1}{4}$ & $-2\sqrt{x} \leq y \leq 2\sqrt{x}$ (d) $0 \leq x \leq \frac{1}{4}$ & $-2\sqrt{x} \leq x \leq 4\sqrt{x}$

Q16. Evaluate $\int_1^2\int_0^y y\,dxdy$

a) 8/3 b) 6/3 c) 7/3 d) 0

Q17. Which of the following integrals contain correct limits of a plate in the form of circle $x^2+y^2=a^2$ in the first quadrant is given by

a) $\int_0^a\int_0^{\sqrt{a^2-x^2}} dydx$ b) $\int_0^a\int_0^a dydx$ c) $\int_0^a\int_0^{\sqrt{x^2-a^2}} dydx$ d) None of these

Q18. The value of $\iint (a^2-x^2-y^2)\,dxdy$ over the region $x^2+y^2 \leq a^2$, is

a) $a^4\pi$ b) a^4 c) $a^2\pi$ d) None of these

Q19. Find the limits of the integral $\iint_R y\,dx\,dy$ by changing the order, where R = $\{0 \leq y \leq 1 \,\&\, 3y \leq x \leq 3\}$

(a) $0 \leq x \leq 4$ & $0 \leq y \leq \frac{x}{4}$ (b) $0 \leq y \leq \frac{x}{3}$ & $0 \leq x \leq 3$

(c) $0 \leq x \leq \frac{x}{3}$ & $0 \leq x \leq 3$ (d) $0 \leq y \leq \frac{x^2}{3}$ & $0 \leq x \leq 3$

Q20. If f(x,y) and g(x,y) are integrable function then $\iint_R [f(x,y)+g(x,y)]\,dx\,dy$ =

(a) $\iint_R f(x,y)dx\,dy + \iint_R g(x,y)dx\,dy$ (b) $\iint_R f(x,y)dx\,dy * \iint_R g(x,y)dx\,dy$

(c) $-\iint_R g(x,y)dx\,dy - \iint_R f(x,y)dx\,dy$ (d) $\iint_R f(x,y)dx\,dy - \iint_R g(x,y)dx\,dy$

Q21. If f(x) is integrable, then $\int_{-a}^{a} f(x)dx = 0$ if f(x) is

a) odd function b) even function c) periodic function d) none

Q22. If $f(x)=\frac{1}{2}(\Pi - x)$ in a Fourier series in the interval 0<x<2π then what is the value of a_n in Fourier series?

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

Q23. Function f(x) = $|\cos x|$ is

(a) even function (b) odd function (c) cannot say (d) none of these

Q24. Which of the following function is odd function?

(a) cos x (b) sin x (c) e^x (d) sec x

Q25. If $f(x) = \left(\frac{\pi - x}{2}\right)$ $for\ 0 < x < 2, then\ value\ of\ b_n\ is$

a) $\frac{1}{n\pi}$ b) $\frac{1}{\pi}$ c) $\frac{\pi}{n}$ d) None of these

Q26. The function $f(x)$ is said to be odd function if

a) $f(x) = -f(x)$ b) $f(-x) = f(x)$ c) $f(-x) = -f(x)$ d) none of these

Q27. limit of $f(x,y)$ $at\ any\ point\ (a,b)$ exist if

a) limit --> infinity b)limit is not unique c) limit is unique d) limit doesn't exist

Q28. *The value of* $\lim_{(x,y)\to(0,0)} \frac{x}{x^2+y^2}$

(a) 1 (b) 2 (c) 0 (d) Limit does not exit

Q29. If f(x, y) = $\frac{x+y}{x-y}$, then $x\frac{\partial F}{\partial x} + y\frac{\partial f}{\partial y}$ is

(a) 0 (b) $\frac{x^2-y}{x}$ (c) $\frac{x+y}{x-y}$ (d) none of these

Q30. Limit of $f(x,y) = \begin{Bmatrix} \frac{x^2+xy+x+y}{x+y}, & (x,y) \neq (2,2) \\ 4, & (x,y) = (2,2) \end{Bmatrix}$ at point (2, 2) is

(a) 0 (b) 4 (c) 3 (d)Does not exist

Q31. The function $f(x,y) = \begin{Bmatrix} \frac{2x^2+y^2}{3+\sin x}; & (x,y) \neq (0,0) \\ 0; & (x,y) = (0,0) \end{Bmatrix}$

a) is continuous at (0, 0) b) is discontinuous at (0, 0) c) Limit does not exists at (0, 0) d) None of these

Q32. The first order partial derivative of $f(x,y) = x^2 e^{\frac{y}{x}}$ $at\ (4,2)$ is

a) $6e$, $4e$ b) $6e^2, 4\,e^2$ c) $6\sqrt{e}, 4\sqrt{e}$ d) $6e^{\frac{1}{2}}, 4\,e^{\frac{1}{2}}$

Q33. Which of the following is a homogeneous function ?

(a) $\frac{x^2+y^3}{2xy}$ (b) $\sin^{-1}\left(\frac{x^2+y^2}{x}\right)$ (c) $\sin^{-1}\left(\frac{x^2+y^2}{2xy}\right)$ (d) None of these

Q34. Let $f(x,y) = \begin{cases} \frac{1}{x+y} & if\ (x,y) \neq (1,-1) \\ 0 & if\ (x,y) = (1,-1) \end{cases}$

Which of the following statements, I, II, III are true?

I. $\lim_{(x,y)\to(1,-1)} f(x,y)$ exists II. $f(1,-1)$ defined III. $f(x,y)$ is continous at (1,-1).

(a) only I (b) only II (c) I and II (d) all of these.

Q35. The nature of the stationary point (1/6,0) of the function $f(x,y) = 3x^2 + y^2 - x$ is a point of

a) Maxima b) Minima c) saddle point d) none of these

Q36. The value of the limit $\lim_{(x,y)\to(0,0)} \left(\frac{x}{\sqrt{x^2+xy}}\right)$ equals to

a) zero b) ½ c) ¼ d) none of these

Q37. What is the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$, if $u = \log\left(\frac{x^2+y^2}{x+y}\right)$?

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

Q38. If $= \sin^{-1}\frac{\sqrt{x^2+y^2}}{x+y}$, then the value of $x\frac{\partial U}{\partial x} + y\frac{\partial U}{\partial y}$ is

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

Q39. $\int_0^1 \int_{y^{\frac{3}{2}}}^{y^{\frac{2}{3}}} dxdy =$

a)1/2 b) 1/3 c) 1/4 d) 1/5

Q40. $\int_0^1 \int_0^x (xy)dxdy =$

a. ¼ b. 1/8 c. 2/9 d. 0

Q41. $\int x^2 \ln x\ dx =$

(a) $\frac{x^3 \ln x - x^3}{3} + C$ (b) $\frac{x^3 \ln x}{3} - \frac{x^3}{9} + C$ (c) $\frac{x^3}{6} + C$ (d) $\frac{x^3 \ln x + x^3}{3} + C$

Q42. If $x = a(t - sint), y = a(1 + cost), then\ \frac{dy}{dx}\ is\ equal\ to$

(a) $-tan\frac{t}{2}$ (b) $cot\frac{t}{2}$ (c) $-cot\frac{t}{2}$ (d) $tan\frac{t}{2}$

Q43. $\int_{-\pi/2}^{\pi/2} sin^7 x\ dx =$

a) 0 b) 1 c) -1 d) none of these

Q44. $\int \cot^2 x dx = ...$

(a) $-\cot x - x + c$ (b) $\tan x + x + c$ (c) $-\cot x + x + c$ (d) $\tan x - x + c$

Q45. The value of integral $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} sin^7 x\ dx$ is equal to

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

Q46. $\int_1^2 x^2 dx =$

a. ½ b. 9/3 c. 7/3 d. 3/7

Q47. $\int \sec x\,(\sec x + \tan x)\,dx =$

(a) tan(x)+c (b) tan(x) +sec(x) +c (c) sec(x) tan(x +c (d) sec(x) /(tan(x) +x)+c

Q48. In Fourier series what is the value of Fourier coefficient for a_0 on $[-l, l]$

(a) $\frac{2}{l}\int_0^l f(x)dx$ (b) $\frac{1}{l}\int_{-l}^l f(x)dx$ (c) $\frac{2}{l}\int_{-l}^l f(x)dx$ (d) $\frac{2}{l}\int_0^l f(x)\cos\left(\frac{n\pi x}{l}\right)dx$

Q49. A "Periodic function " is given by a function which

a) has a period $T=2\pi$ b)Satisfies f(t+T)=f(t) c) Satisfies f(t+T)= -f(t) d) has a period $T=\pi$

Q50. Which of the following is an even function of t?
(a) t^2 (b) $t^2 - 4t$ (c) $sin2t + 3t$ (d) $t^3 + 6$

Q51. The value of the determinant $\begin{vmatrix} 2 & 3 & 5 & 4 \\ 1 & 2 & 3 & 4 \\ 2 & 3 & 5 & 4 \\ 6 & 4 & 2 & 3 \end{vmatrix}$ is :
(a) 0 (b) -1 (c) 4 (d) None of these

Q52. A 5×5 matrix has all its entries equal to -1, the rank of the matrix is
(a) 7 (b) 5 (c) 1 (d) 0

Q53. Find $\int_0^{\pi/2} sin^2x\, dx$
(a)0 (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{3}$

Q54. $\int (2x^2-5)^2\, 4x\, dx = ?$
(a) $\frac{(2x^2-5)^3}{12}$ + c (b) $-\frac{(2x^2-5)^3}{3} + c$ (c) $\frac{(2x^2-5)^3}{3} + c$ (d) $\frac{(2x^2-5)^3}{12}$ + c

Q55. The value of $\frac{dy}{dx}$ when $x = asec^3t\, , y = atan^3t$ at $t = \frac{\pi}{2}$ is
(a)-1 (b)1 (c) $\frac{-1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{2}}$

Q56. $\frac{d}{dx}\{e^{x^2+sinx}\} is$
(a) (2x +cosx) e^{x^2+sinx} (b) e^{x^2+sinx} (c) 2x + cosx (d) 2x -cosx

Q57. $\int_0^{\Pi/2} \sin^2 x dx$ is equal to
(a) $\frac{\Pi}{6}$ (b) $\frac{\Pi}{3}$ (c) $\frac{\Pi}{4}$ (d) $\frac{\Pi}{2}$

Q58. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \ \ldots\infty}}}$, then $\frac{dy}{dx}$ is equal to
a) 1 b) $\frac{1}{xy}$ c) $\frac{1}{2y-x}$ d) $\frac{1}{2y-1}$

Q59. The derivative of $y = 2^{\sin x} is:$
(a) $\frac{dy}{dx} = \ln 2 \cdot \cos x$ (b) $\frac{dy}{dx} = 2^{\sin x} \cdot \ln 2 \cdot \cos x$ (c) $\frac{dy}{dx} = 2^{\sin x} \cdot \cos x$ (d) None of these

Q60. If f(x) = $3x^2$, then what is the anti-derivative of f(x)?
(a) 0 (b) x^3 (c) x^3 + C (d) 6x + C

Q61. If AX=B is non homogenous system of equation then if rank of [A|B] =rank of [A]≠number of variables then system of equations has
(a) No solution (b) unique solution (c) infinitely many solutions (d)none

Q62. If $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$, then A^8 is equal to
a) $625I$ b) $125I$ c) $-625I$ d) $25I$

Q63. If A = $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$ the eigen value of A^{-1} are
(a) -1 ,$-\frac{1}{2},\frac{1}{3}$ (b)-1 $,\frac{1}{2},\frac{1}{3}$ (c) 1 $,\frac{1}{2},\frac{1}{3}$ (d) 1 $,\frac{1}{2},-\frac{1}{3}$

Q26. $\int \frac{1}{x^2+4} dx$ is equal to :

a) $\tan^{-1}(x/2)+c$ b) $\left(\frac{1}{2}\right)\tan^{-1} x$ +c c) $\tan^{-1} 2$ +c d) $\left(\frac{1}{2}\right)\tan^{-1}\left(\frac{x}{2}\right)$+c

Q27. If $f(x)=x^4$ in interval (-L, L), value of b_n in Fourier series of f(x) is

a) 1 b) $\frac{1-\pi n}{\pi}$ c) 0 d) $4L^2$

Q28. The value of $\cos(n\pi)$

a) 1 b) 0 c) $(-1)^n$ d) ½

Q29. The value of $\sin(n\pi)$

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

Q30. The function $f(x)=\sin(n\pi x).\sin(x)$ is (n is a fixed natural number)
a) odd function b) even function c) cannot say d) none of these

Q31. If f(x)=x sinx, $0<x<2\pi$ and let $f(x)=\frac{a_0}{2}+\sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$ be its Fourier series expansion, then value of a_0 is.

a) 2 b) π c) -2 d) $-\pi$

Q32. Which of the following condition is necessary for Fourier series expansion of f(x) in the internal (c, c+2l)
a) f(x) should be continuous in (c,c +2l)
b) f(x) should be periodic
c) f(x) should be even
d) f(x) should be odd

Q33. $\int_a^{a+2\pi} \cos nx \, dx$ is equal to
a) 1 b) π c) $-\pi$ d) 0

Q34. If $f(x)=\frac{a_0}{2}+\sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$ be the Fourier series expansion in the interval $a<x<a+2\pi$ then. a_0 is
a) $\frac{1}{\pi}\int_a^{a+2\pi} f(x)dx$
b. $\frac{1}{\pi}\int_a^{a+2\pi} f(x)\sin nx \, dx$
c. $\frac{1}{\pi}\int_a^{a+2\pi} f(x) \; nx \, dx$
d. $\frac{1}{\pi}\int_a^{a+2\pi} f(x)\cos nx \, dx$

Q35. Express $f(x)=x-x^2$ as half range sine series in the internal 0<x<1, if $b_n = \frac{4[1-(-1)^n]}{n^3\pi^3}$
a) $f(x)=\frac{8}{\pi^2}(\frac{1}{1^3}\sin\pi x + \frac{1}{3^3}\sin 3\pi x + \frac{1}{5^3}\sin 5\pi x \dots\dots.)$
b) $f(x)=\frac{1}{\pi}(\sin\frac{\pi x}{2}+\frac{1}{2}\sin\frac{2\pi x}{2}+\frac{1}{3}\sin\frac{2\pi x}{2}+\frac{1}{4}\sin\frac{2\pi x}{2}+\cdots\dots.)$
c) $f(x)=\frac{2}{\pi}(\sin\frac{\pi x}{2}+\frac{1}{2}\sin\frac{2\pi x}{2}+\frac{1}{3}\sin\frac{3\pi x}{2}+\frac{1}{4}\sin\frac{4\pi x}{2}+\cdots\dots.)$
d) $f(x)=\frac{4}{\pi}(\sin\frac{\pi x}{2}-\frac{1}{2}\sin\frac{2\pi x}{2}+\frac{1}{3}\sin\frac{2\pi x}{2}-\frac{1}{4}\sin\frac{2\pi x}{2}+\cdots\dots.)$

Q36. If $f(x)=x^2$, defined in - 4 <x<4, then which of the following will be true for Fourier expansion of f(x)
a) $a_o = 0$, $a_n = 0$ b) $a_0 = 0$ c) $a_o = 0$, $b_n = 0$ d) $b_n = 0$

Q37. The function $f(x)=\cos(n\pi x).\sin(x)$ is (where n is a fixed natural number)
a) odd function
b) even function
c) cannot say
d) none of these

Q38. Let f(x)=x , $-\pi<x<\pi$ and f(x)=$\frac{a_0}{2}+\sum_{n=1}^{\infty} a_n \cos nx+\sum_{n=1}^{\infty} b_n \sin nx$ be its Fourier series expansion. Then the value of a_0 is

a) 0 b) π c) -2 d) $-\pi$

Q39. Let f(x)=x^2 , $-\pi<x<\pi$ and f(x)=$\frac{a_0}{2}+\sum_{n=1}^{\infty} a_n \cos nx+\sum_{n=1}^{\infty} b_n \sin nx$ be the Fourier series expansion then the value of b_n is

a) 0 b) π c) -2 d) $-\pi$

Q40. If f(x) = $\sum_{n=1}^{\infty} b_n$ sin nx be defined in the interval (0,π), then the value of b_n is

(a) $\int_0^\pi f(x)\sin nx\,dx$

(b) $\int_0^\pi f(x)\cos nx\,dx$

(c) $\frac{2}{\pi}\int_0^\pi f(x)\sin nx\,dx$

(d) none of these

-- End of Question Paper --

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Q52. Which of the following statement is not true:
(a) Extremum is a value which is either a maximum or minimum.
(b) Saddle point is a point, where the function is neither maximum nor minimum.
(c) Every stationary point is an extrema.
(d) Extrema occurs only at stationary points.

Q53. If $f(x,y) = xy\left(\frac{x^2-y^2}{x^2+y^2}\right)$, where $(x,y) \neq (0,0)$ and $f(0,0) = 0$, then choose the correct statement:
(a) $f_{xy}(0,0) = 1$ (b) $f_{xy}(0,0) = f_{yx}(0,0)$ (c) $f_{yx}(0,0) \neq f_{yx}(0,0)$ (d) $f_{yx}(0,0) = -1$

Q54. Evaluate $\frac{dz}{dt}$ at t=1, where $z = xy^2 + x^2y, x = at^2, y = 2at$:
(a) 26 (b) 26a (c) $36a^3$ (d) $26a^3$

Q55. If $f(x,y) = \frac{x+y}{x-y}$, find $\frac{\partial f}{\partial x}$ at (2,-1):
(a) 2 (b) -2 (c) 0 (d) 3

Q56. For the function $f(x,y) = x^2 + xy$, comment about the point (0,0):
(a) point of maxima (b) point of minima (c) neither maxima nor minima (d) not a critical point

Q57. Consider a function defined by $(x,y) = \begin{cases} \frac{x^2y}{x^4+y^2}, & otherwise \\ 0, & (x,y) = (0,0) \end{cases}$, then

(a) $f(x,y)$ is continuous at (0,0).
(b) $\lim_{(x,y)\to(0,0)} f(x,y)$ exists.
(c) $f(x,y)$ is not differentiable at (0,0).
(d) $f(x,y)$ is continuous but not differentiable.

Q58. If $z = e^x y^2, x = tcost, y = tsint$, compute $\frac{dz}{dt}$ at $t = \frac{\pi}{2}$:
(a) $1 - \frac{\pi}{2}$ (b) $\pi^2 - \frac{\pi}{2}$ (c) $\pi^2 - \frac{\pi^3}{2}$ (d) $\pi - \frac{\pi^3}{8}$

Q59. If $u = \sin^{-1}\left(\frac{x^2+y^2}{x^2-y^2}\right)$, then $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y}$:
(a) $\sec u$ (b) 1 (c) 0 (d) $\tan u$

Q60. If $z = x^3 - xy + y^3$ and $x = rcos\theta, y = rsin\theta. Evaluate \frac{\partial z}{\partial \theta}$ at $\theta = \frac{\pi}{2}$:
(a) r^2 (b) $3r - 1$ (c) $-r^2$ (d) $r^2 - 2$

Q61. The area between the parabolas $y^2 = 4ax\ and\ x^2 = 4ay$ is:
(a) $\frac{16}{3}a$ (b) $\frac{16}{3a}$ (c) $\frac{16}{3}a^2$ (d) $\frac{a^2}{3}$

Q62. Evaluate $\iint xydxdy$ over the positive quadrant of the circle $x^2 + y^2 = 4$:
(a) 2 (b) 2.25 (c) 1.5 (d) 3

Q63. The value of the fourier coefficient b_n in half range sine series of $f(x) = x$ in $0 < x < 2$ is:
(a) $\frac{(-1)^n 4}{n^2\pi}$ (b) $\frac{4}{n^2\pi^2}[(-1)^n - 1]$ (c) $-\frac{4}{n\pi} - 1$ (d) $-\frac{(-1)^n 4}{n\pi}$

Q64. The Fourier series for the function $f(x) = x - x^2$ in the interval $-\pi < x < \pi$ contains:
(a) sine terms (b) cosine terms (c) sine and cosine terms (d) None of these

Q65. Using the concept of change of interval, the value of a_0 in the Fourier series expansion of
$f(x) = \begin{cases} \pi x, & 0 \le x \le 1 \\ \pi(2-x), & 1 \le x \le 2 \end{cases}$:
(a) π (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{6}$ (d) $\frac{3\pi}{2}$

Q66. Which of the following is an "odd" function of t:
(a) t^2 (b) $5t^2 + 4t^4$ (c) $\sin 2t + 3t$ (d) $t^3 + 6$

Q67. The behaviour of the Fourier series near a point of discontinuity is called:
(a) Gibbs phenomenon (b) frequency spectrum (c) superposition principle (d) D' Alembert phenomenon

Q68. The Fourier coefficient b_n in the expansion of x^2 in the interval (-p,p) is:
(a) 0 (b) 2 (c) $\frac{8}{3}$ (d) $\frac{1}{3}$

Q69. Choose the function $f(t), -\infty < t < \infty$, for which a Fourier series cannot be defined:
(a) 3 (b) $cos3t + 2$ (c) $e^{-3t}\sin(5t)$ (d) $sint$

Q70. The Fourier coefficient a_0 for the function given by :
$f(x) = \begin{cases} x^2, & 0 \le x \le 2 \\ 4, & 2 \le x \le 4 \end{cases}$
(a) 8 (b) $\frac{1}{3}$ (c) $\frac{8}{3}$ (d) $\frac{16}{3}$

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Q21. If $u = \frac{y^3-x^3}{y^2+x^2}$ then $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2}$ is

a) $3u$ b) 2u c) u d) 0

Q22. If $f(x,y)$ is a homogeneous function of degree n in x & y and has continuous first and second order partial derivatives then

a) $x^2\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial x \partial y} + y^2\frac{\partial^2 f}{\partial y^2} = n(n-1)f$ b) $x^2\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial x \partial y} + y^2\frac{\partial^2 f}{\partial y^2} = nf$

c) $x^2\frac{\partial^2 f}{\partial x^2} + 2xy\frac{\partial^2 f}{\partial x \partial y} + y^2\frac{\partial^2 f}{\partial y^2} = n(n-1)f$ d) $x^2\frac{\partial^2 f}{\partial x^2} + 2xy\frac{\partial^2 f}{\partial x \partial y} + \frac{\partial^2 f}{\partial y^2} = n(n-1)f$

Q23. If $r = \frac{\partial^2 f}{\partial x^2}(a,b)$, $s = \frac{\partial^2 f}{\partial x \partial y}(a,b)$, $t = \frac{\partial^2 f}{\partial t^2}(a,b)$, then $f(x,y)$ will have a maxima at(a,b) if

a) $rt > s^2$, and $r < 0$ b) $rt > s^2$, and $r > 0$

c) $rt = s^2$, and $r < 0$ d) $rt = s^2$, and $r > 0$

Q24. For the function $f(x,y) = 2(x^2 - y^2) - x^4 + y^4$ the critical point(1,0) is a point of

a) Maxima b) Minima c) saddle point d) None of these

Q25. If $x = \cos\theta$, $y = \sin\theta$ then $\frac{\partial(x,y)}{\partial(r,\theta)}$ is

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

Q26. $\int\int x^2y^3\, dx\, dy$ over the rectangle $0 \le x \le 1, 0 \le y \le 1$ is

a) $\frac{1}{12}$ b) 2 c) $\frac{3}{4}$ d) None of these

Q27. $\iint e^x\, dx\, dy$over the rectangle $0 \le x \le 1$ & $0 \le y \le 1$ is

a) e d) $e-1$ c) $e-2$ d) e^2

Q28. The point of intersection of the curve $y = x^2, y = 4 - x^2$ are

a) $(-\sqrt{2},2),(\sqrt{2},2)$ b) $(\sqrt{2},0),(-\sqrt{2},1)$ c)$(-\sqrt{2},1),(\sqrt{2},2)$ d) None of these

Q29. If R is the region bounded by the $x-$axis, the line $y = 2x$ & the parabola $y = \frac{x^2}{4a}$ then for the evaluation of $\iint xy\, dxdy$ over the R, R is given by

a) $\{(x,y): \frac{x^2}{4a} \le y \le 2x, 0 \le x \le 8a\}$ b) $\{(x,y): \frac{x^2}{4a} \le y \le 8a, 0 \le x \le 8\}$

c) $\{(x,y): 2x \le y \le 2x^2, 0 \le x \le 8a\}$ d) None of these

Q30. Which of the following is used to find the area over the region R?

a) $\int\int_R f(x,y)\, dxdy$ b) $\int\int_R dxdy$ c)$\int\int_R x\, dxdy$ d) $\int\int_R y\, dxdy$

Q31. On changing the order of $\int_0^1\int_{2y}^2 e^{x^2} dx\, dx$, we get

a) $\int_0^2\int_0^{2x} e^{x^2} dydx$ b) $\int_0^2\int_0^{x/2} e^{x^2} dydx$ c)$\int_0^2\int_0^{x/2} dydx$ d) $\int_0^2\int_0^{3x} e^{y^2} dydx$

Q32. Value of $\int_0^1\int_x^{\sqrt{x}} xydxdy$ is

a) 0 b) $-\frac{1}{24}$ c) $\frac{1}{24}$ d) 24

Q33. Value of $\int_0^2\int_0^{x^2} e^{\frac{y}{x}} dydx$ is

a) e^2 b) $e^2 - 1$ c)$e^2 - 2$ d) None of these

Q34. Value of $\int_0^1\int_0^{x^2} xe^y dydx$is equal to

a) $\frac{e}{2}$ b) $e - 1$ c)$1 - e$ d) $\frac{e}{2} - 1$

Q35. Value of $\int_0^a \int_0^b \int_0^c x^2y^2z^2\, dxdydz$ is

a) $\frac{abc}{3}$ b) $\frac{a^2b^2c^2}{27}$ c) $\frac{a^3b^3c^3}{27}$ d) $\frac{a^2b^2c^2}{9}$

Q36. The integral $\int_{-a}^{a}\int_0^{\sqrt{a^2-y^2}} f(x,y)dxdy$ after changing the order of integration becomes

a) $\int_0^a \int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} f(x,y)dydx$

b) $\int_{-a}^{a} \int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} f(x,y)dydx$

c) $\int_0^a \int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} dydx$

d) None of these

Q37. Value of $\int_0^5 \int_0^{x^2} x(x^2+y^2)dxdx$ is

a) $5^6[\frac{1}{6}-\frac{5^2}{24}]$ b) $5^6[\frac{1}{6}+\frac{5^2}{24}]$ c) 5^6 d) $[\frac{1}{6}+\frac{5^2}{24}]$

Q38. Value of the integral $\int_0^1\int_0^1\int_0^1 dxdydz$ is

a) 1 b) 2 c) 3 d) 4

Q39. Volume of the solid bounded by the planes $x=0, y=0, x+y+z=a$ & $z=0$ is given by

a) $\int_0^a\int_0^{a-x} dydx$

b) $\int_0^a\int_0^a\int_0^a dzdydx$

c) $\int_0^a\int_0^{a-x}\int_0^{a-x-y} dzdydx$

d) None of these

Q40. To change the rectangular coordinates (x,y,z) to cylindrical coordinates (ρ,ϕ,z), we assume

a) $x=\rho\cos\phi,\ y=\rho\sin\phi, z=z$

b) $x=\rho\cos\phi,\ y=\rho\cos\phi, z=z$

c) $x=\rho\sin\phi,\ y=\rho\sin\phi, z=z$

d) None of these

Q41. If $f(x,y)=x^3+y^3+x$ then $\frac{\partial f}{\partial x}$ & $\frac{\partial f}{\partial y}$ is

a) $3x^2+3y^2+1, 3y^2+1$ b) $3x^2+1, 3y^2$ c) x^2+1, y^2 d) $3x^2, y^2$

Q42. Total derivative of $z=\tan^{-1}\left(\frac{x}{y}\right), (x,y)\neq(0,0)$ is

a) $\frac{ydx+ydy}{x^2+y^2}$ b) $\frac{ydx-xdy}{x^2+y^2}$ c) $ydx-xdy$ d) $ydx+xdy$

Q43. If $w=x^2+y^2, x=\frac{t^2-1}{t},\ y=\frac{t}{t^2+1}$ then $\frac{dw}{dt}$ at $t=1$ is

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

Q44. If $f(x,y)=x^4-x^2y^2+y^4$ then $\frac{\partial f}{\partial x}$ at $(-1,1)$ is

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

Q45. If $z=\log\left[\frac{x^2-y^2}{x^2+y^2}\right]$, then $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}$ is

a) 0 b) z c) $2z$ d) $3z$

Q46. If $\cot^{-1}\left(\frac{x}{y}\right)+y^3+1=0, x>0, y>0$ then $\frac{dy}{dx}$ is

a) $\frac{y}{x+3y^2(x^2+y^2)}$ b) $\frac{x}{x+3y^2(x^2+y^2)}$ c) $\frac{1}{x+3y^2}$ d) $\frac{y}{x+3x^2(x^2+y^2)}$

Q47. If $u=x^3+y^3$, then $\frac{\partial^2 u}{\partial x^2}$ is

a) $3x^2$ b) $6x$ c) 6 d) 0

Q48. If $u = \frac{x^3+y^3}{x+y}, (x,y) \neq (0,0)$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is

a) 0 b) u c) 2u d) 3u

Q49. If $u = \cos^{-1}[\frac{x+y}{\sqrt{x}+\sqrt{y}}],\ 0 < x < 1$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is

a) 0 b) $2u$ c) $-\frac{1}{2}\cot u$ d) None of these

Q50. $f(x,y) = \frac{\sqrt{x^2+y^2}}{x}$ is a homogeneous function of degree

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

Q51. If $y = \log[(x+2)(x^3-x)]$ then $\frac{dy}{dx}$ is

a) $(x+2)+(x^3-x)$ b) $\frac{1}{x+2}+\frac{3x^2-1}{x^3-x}$ c) $\frac{1}{x+2}+\frac{3x^2}{x^3-x}$ d) $\frac{3x^2-1}{x^3-x}$

Q52. If $y = \sqrt{\log(\log x)}$ then $\frac{dy}{dx}$ is

a) $\frac{1}{2x\log x\sqrt{\log(\log x)}}$ b) $\frac{1}{2\log x\sqrt{\log(\log x)}}$ c) $\frac{1}{2x\log x\sqrt{\log x \log x}}$ d) none of these

Q53. $\int \left(x^{\frac{2}{3}}+1\right)dx$ is equal to

a) $\frac{3}{5}x^{\frac{5}{3}}+x+c$ b) $x^{\frac{5}{3}}+x+c$ c) $\frac{1}{5}x^{\frac{5}{3}}+x+c$ d) $\frac{2}{5}x^{\frac{5}{3}}+x+c$

Q54. $\int(\sin x+\cos x)dx$ is equal to

a) $-\cos x+c$ b) $-\cos x+\sin x+c$ c) $\cos x-\sin x+c$ d) $\cos x+\sin x+c$

Q55. The anti-derivative F of f defined by $f(x) = 4x^3-6$, where $F(0) = 3$ is

a) x^4-6x b) x^4-6x+3 c) x^4+3 d) x^4-3

Q56. Which of the following is true?

a) $\int \tan x\ dx = sex^2x+c$ b) $\int \tan x\ dx = log|\sec x|+c$

c) $\int \tan x\ dx = \log|\cos x|+c$ d) $\int \tan x\ dx = log|cosec\ x|+c$

Q57. The value of $\int \frac{2x}{1+x^2}dx$ is

a) $\frac{(1+x^2)^2}{2}+c$ b) $(1+x^2)^2+c$ c) $\log(1+x^2)+c$ d) none of these

Q58. $\int \sin^3 x\, dx$ is equal to

a) $-\cos x+\frac{1}{3}\cos^3 x+c$ b) $\cos x+\frac{1}{3}\cos^3 x+c$

c) $-\cos x-\frac{1}{3}\cos^3 x+c$ d) none of these

Q59. $\lim_{(x,y)\to(2,1)}(3x+4y)$ is equal to

a) 10 b) 9 c) 11 d) does not exist

Q60. $\lim_{(x,y)\to(0,0)}\frac{xy}{x^2+y^2}$ is equal to

a) 0 b) 1 c) 2 d) does not exist

Q61. What is a if $\begin{bmatrix} a & 2 \\ 5 & 1 \end{bmatrix}$ is a singular matrix?

a) 5 b) 10 c) 15 d) 20

Q1. If $u = \log(x^2 + y^2)$ then $\frac{\partial u}{\partial x}$ at (1, 1) is

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

Q2. $\lim_{(x,y)\to(0,0)} \frac{2x}{x^2 + y^2}$ is

(a) 0 (b) 1 (c) 2 (d) limit does not exists

Q3. $\lim_{(x,y)\to(1,0)} \frac{(1-x)\sin y}{y \log x}$ is

(a) -1 (b) 1 (c) 0 (d) limit does not exists

Q4. $f(x,y) = \frac{x^3 y + y^2 x^2}{\sqrt{x^2 + y^2}}$ is homogenous function of degree

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

Q5. Let $f(x,y) = \begin{cases} \frac{1}{x+y} & if \quad (x,y) \neq (1,-1) \\ 0 & if \quad (x,y) = (1,-1) \end{cases}$

Which of the following statements, I, II, III are true?

I. $\lim_{(x,y)\to(1,-1)} f(x,y)$ exists II. $f(1,-1)$ defined III. $f(x,y)$ is continous at (1,-1).

(a) only I (b) only II (c) I and II (d) all of these.

Q6. If $u(x,y) = \frac{x^{\frac{5}{2}} + y^{\frac{5}{2}}}{\sqrt{x+y}}$ then $xu_x + yu_y =$

(a) $3u$ (b) 2 u (c) $\frac{5}{2}u$ (d) $\frac{1}{2}u$

Q7. Which of the following is not homogenous function

(a) $\sin^{-1}\left(\frac{x+y}{x^2+y^2}\right)$ (b) $\cot^{-1}\left(\frac{y}{x}\right)$ (c) $\frac{xyz}{x^3+y^3+z^3}$ (d) $\frac{x^3+y^2x}{\sqrt{x^2+y^2}}$

Q8. The critical point of the function $f(x,y) = x^2 + y^2 - 2x + 2y$ is

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

Q9. If $r = f_{xx}(a,b)$, $s = f_{xy}(a,b)$ and $t = f_{yy}(a,b)$ then $f(x,y)$ will have a maximum at (a,b) if

(a) $f_x = f_y = 0$, $rt < s^2$, $r < 0$

(b) $f_x = f_y = 0$, $rt = s^2$, $r > 0$

(c) $f_x = f_y = 0$, $rt > s^2$, $r > 0$

(d) $f_x = f_y = 0$, $rt > s^2$, $r < 0$

Q10. If $u(x,y) = \frac{x}{y} + \frac{y}{x}$ then $xu_x + yu_y =$

(a) $\frac{1}{2}u$ (b) $-u$ (c) u (d) 0

Q11. If $z = 3x + 2y$ and $x = 2t$, $y = 3t$ then $\frac{dz}{dt}$ is

(a) 0 (b) 5 (c) 12 (d) 13

Q12. If $w = f(x,y)$ and $x = x(u,v)$, $y = (u,v)$. Then $\frac{\partial w}{\partial u}$ is equal to

(a) $\frac{\partial f}{\partial u}\frac{\partial x}{\partial u} + \frac{\partial f}{\partial u}\frac{\partial y}{\partial u}$

(b) $\frac{\partial f}{\partial u}\frac{\partial u}{\partial x} + \frac{\partial f}{\partial u}\frac{\partial u}{\partial y}$

(c) $\frac{\partial f}{\partial x}\frac{\partial x}{\partial u} + \frac{\partial f}{\partial y}\frac{\partial y}{\partial u}$

(d) $\frac{\partial f}{\partial v}\frac{\partial x}{\partial u} + \frac{\partial f}{\partial v}\frac{\partial y}{\partial u}$

Q13. If $r = f_{xx}(a,b)$, $s = f_{xy}(a,b)$ and $t = f_{yy}(a,b)$ then $f(x,y)$ will have a minimum at (a,b) if

(a) $f_x = f_y = 0$, $rt - s^2 < 0$, $r < 0$

(b) $f_x = f_y = 0$, $rt - s^2 = 0$, $r > 0$

(c) $f_x = f_y = 0$, $rt - s^2 > 0$, $r > 0$

(d) $f_x = f_y = 0$, $rt - s^2 > 0$, $r < 0$

Q14. Value of $\int_{x=0}^{3}\int_{y=0}^{1}(xy^2)\,dy\,dx$ is

(a) $\frac{3}{2}$ (b) $\frac{9}{4}$ (c) $\frac{9}{2}$ (d) $\frac{3}{4}$

Q15. After changing the order of integration in $\int_{0}^{2}\int_{y=0}^{\frac{x^2}{2}} f(x,y)\,dy\,dx =$

(a) $\int_{y=-2}^{2}\int_{x=\sqrt{2y}}^{0} f(x,y)\,dx\,dy$

(b) $\int_{y=0}^{2}\int_{x=-\sqrt{2y}}^{\sqrt{2y}} f(x,y)\,dx\,dy$

(c) $\int_{y=0}^{2}\int_{x=\sqrt{2y}}^{0} f(x,y)\,dx\,dy$

(d) none of these

Q16. Polar form of the integral $\int_{-1}^{1}\int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} dx\,dy$ is

(a) $\int_0^1\int_0^r r\,d\theta\,dr$ (b) $\int_0^{2\pi}\int_0^1 r\,dr\,d\theta$ (c) $\int_0^{2\pi}\int_0^1 r\,dr\,d\theta$ (d) $\int_0^{\pi}\int_0^1 r\,dr\,d\theta$

Q17. If V is the volume bounded by $x^2 + y^2 + z^2 \le x$, then limit of r is

(a) $0 \le r \le \sin\theta$ (b) $0 \le r \le \cos\theta$ (c) $0 \le r \le \sin\theta\sin\phi$ (d) $0 \le r \le \sin\theta\cos\phi$

Q18. After changing the order of integration, the integral $\int_{-1}^{1}\int_{0}^{\sqrt{1-y^2}} f(x,y)\,dx\,dy$ is equal to

(a) $\int_{0}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)\,dy\,dx$ (b) $\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)\,dy\,dx$

(c) $\int_{1}^{0}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)\,dy\,dx$ (d) $\int_{0}^{1}\int_{0}^{\sqrt{1-x^2}} f(x,y)\,dy\,dx$

Q19. The area bounded by the lines $x=0, y=0$ and $x+y=1$ is given as

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

Q20. The value of $\int_{0}^{1}\int_{0}^{x}\int_{0}^{x+y} dz\,dy\,dx$ is

(a) $\frac{1}{8}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{6}$

Q21. The area bounded by cylinder $x^2+y^2=1, 0\le z\le 4$ is

(a) $\int_{0}^{4}\int_{0}^{1}\int_{0}^{\sqrt{1-x^2}} dydxdz$ (b) $\int_{0}^{4}\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dydxdz$

(c) $\int_{0}^{4}\int_{0}^{\sqrt{1-y^2}}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dydxdz$ (d) $\int_{0}^{4}\int_{0}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dydxdz$

Q22. The area bounded by first quadrant of circle $x^2+y^2=4$ is

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

Q23. Cylindrical polar form of $\int_{0}^{1}\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} dy\,dx\,dz$ is

(a) $\int_{0}^{2\pi}\int_{0}^{1}\int_{0}^{1} r\,dr\,dz\,d\theta$ (b) $\int_{0}^{2\pi}\int_{0}^{2}\int_{-1}^{1} r\,dr\,dz\,d\theta$ (c) $\int_{0}^{2}\int_{-\pi}^{\pi}\int_{0}^{1} r\,dr\,d\theta\,dz$ (d) $\int_{0}^{2}\int_{0}^{\frac{\pi}{2}}\int_{0}^{1} r\,dr\,d\theta\,dz$

Q24. The value of integral $\int_{0}^{\pi/2}\int_{0}^{\cos\theta} dr\,d\theta$ is

(a) -1 (b) 0 (c) 1 (d) none of these

Q25. Polar form of the integral $\int_{-1}^{1}\int_{0}^{\sqrt{1\ x^2}} (x^2+y^2)dy\,dx$ is

(a) $\int_{0}^{1}\int_{0}^{r} r^3 d\theta\,dr$ (b) $\int_{0}^{\pi}\int_{0}^{1} r^3 dr\,d\theta$ (c) $\int_{0}^{2\pi}\int_{0}^{1} r^2 dr\,d\theta$ (d) $\int_{0}^{\pi}\int_{0}^{1} r^2 dr\,d\theta$

Q.10 Which of the following options is not correct for

Q26. Volume of one octant of sphere $x^2+y^2+z^2=1$ is given as

a) $\int_0^{\pi}\int_0^{1}\int_0^{r} r^2 \sin\theta \, d\theta \, dr \, d\varphi$

(b) $\int_0^{1}\int_0^{\pi/2}\int_0^{\pi/2} r^2 \sin\theta \, dr \, d\theta \, d\varphi$

(c) $\int_0^{1}\int_0^{\pi/4}\int_0^{\pi/2} r^2 \sin\varphi \, dr \, d\theta \, d\varphi$

(d) none of these

Q27. The Fourier coefficient b_2 of $f(x) = x$ *in the interval* $(-2,2)$

(a) -2π (b) 0 (c) 2π (d) none of these

Q28. Find the Fourier coefficient a_0 for $f(x) = 2x$; $-1 \le x \le 1$

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

Q29. The Fourier coefficient a_2 of $f(x) = \frac{(\pi)}{2}$ *in the interval* $(-\pi,\pi)$

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

Q30. Find the Fourier coefficient a_2 for $f(x) = x$; $-\pi \le x \le \pi$

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

Q31. if $f(x) = \sin x$; $-\pi \le x \le \pi$, then (Fourier coefficient) a_0 is

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

Q32. if $f(x) = \cos x$; $-\pi \le x \le \pi$, then Fourier coefficient b_n is

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

Q33. Fourier coefficient b_1 of $f(x) = \begin{cases} 2; & 0 \le x \le 1 \\ 0; & -1 \le x \le 0 \end{cases}$

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

Q34. Find the Fourier coefficient a_1 of $f(x) = 2x^3$ *in the interval* $(-1,1)$

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

Q35. $\beta(n,m) =?$

(a) $\frac{\gamma(m)/\gamma(n)}{\gamma(m+n)}$ (b) $\frac{\gamma(m)-\gamma(n)}{\gamma(m+n)}$ (c) $\frac{\gamma(m).\gamma(n)}{\gamma(m+n)}$ (d) none of these

Q36. $\beta(8,6) =?$

(a) 1/5150 (b) 1/5148 (c) 1/5146 (d) none of these

Q37. Find the Fourier coefficient b_1 of $f(x) = |x|$ *in the interval* $(-1,1)$

(a) 0 (b) -1 (c) 1 (d) none of these

Q38. $\beta(m,n) =?$

(a) $2\,\beta(n,m)$ (b) $\beta(m/n)$ (c) $\beta(m-n)$ (d) *none of these*

Q39. $\gamma\left(\frac{4}{3}\right) =?$

(a) $\frac{4}{3}\gamma\left(\frac{5}{3}\right)$ (b) $\frac{4}{3}\gamma\left(\frac{2}{3}\right)$ (c) $\frac{1}{3}\gamma\left(\frac{1}{3}\right)$ (d) none of these

Q40. Fourier coefficient b_n for half range cosine series has the value as

(a) 1 (b) 0 (c) -1 (d) none of these

-- End of Question Paper --

Name...

Q.1 $\lim\limits_{(x,y)\to(0,0)}\left[\cot^{-1}\left(\dfrac{2}{\sqrt{(y^2+x^2)}}\right)\right]=?$

(a) 0 (b) $\pi/2$ (c)1 (d) Does not exist.

Q.2 $\lim\limits_{(x,y)\to(0,0)}\left(\dfrac{x^4y-3x^2y^3+y^5}{(y^2+x^2)^2}\right)=?$

(a) 0 (b) -1 (c)1 (d) Does not exist.

Q.3 $\lim\limits_{(x,y,z)\to(0,0,0)}\left(\dfrac{xy^2z^2}{x^4+y^4+z^8}\right)=?$

(a) 0 (b) -1 (c)1 (d) Does not exist.

Q.4 $\lim\limits_{(x,y)\to(0,0)}\left(\dfrac{x^4y^2}{(y^2+x^4)^2}\right)=?$

(a) 0 (b) -1 (c)1 (d) Does not exist.

Q.5 $\lim\limits_{(x,y)\to(0,0)}\left(\dfrac{y^2+x^2}{\tan(xy)}\right)=?$

(a) 0 (b) -1 (c)1 (d) Does not exist.

Q.6 $\lim\limits_{(x,y)\to(0,0)}\left(\dfrac{e^{xy}}{1-y^2}\right)=?$

(a) 0 (b) -1 (c)1 (d) Does not exist.

Q.7 $\lim\limits_{(x,y)\to(0,0)}\left[\dfrac{\sin^{-1}(x-2y)}{\tan^{-1}(2x-4y)}\right]=?$

(a) 0 (b) -1/2 (c)1/2 (d) Does not exist.

Q.8 Which of the following options is correct for

$$f(x,y)=\begin{cases}\dfrac{xy}{x^2+2y^2}, & (x,y)\neq(0,0)\\ 0, & (x,y)=(0,0)\end{cases}$$

(a) $f_x(0,0)=0, f_y(0,0)=0$ (b) $f_x(0,0)=1, f_y(0,0)=0$

(c) $f_x(0,0)=0, f_y(0,0)=1$ (d) $f_x(0,0)=1, f_y(0,0)=1$.

Q.9 Which of the following options is not correct for

$$f(x,y)=\begin{cases}(y^2+x^2)\sin\left(\dfrac{1}{y^2+x^2}\right), & (x,y)\neq(0,0)\\ 0, & (x,y)=(0,0)\end{cases}$$

(a) $f_x(0,0)=0, f_y(0,0)=0$

(b) $f_x(0,0)\, does\ not\ exist, f_y(0,0)=0$

(c) $f_x(0,0)=0, f_y(0,0)=does\ not\ exist$

(d) $both\, f_x(0,0), f_y(0,0)\, do\ not\ exist..$

Q.No.	1	2	3	4	5	6	7	8	9
Option									

Reg.No...Roll No........SET-A

Q.10 Which of the following options is not correct for

$$f(x,y)=\begin{cases}\dfrac{xy}{x^2+y^2}, & (x,y)\neq(0,0)\\ 0, & (x,y)=(0,0)\end{cases}$$

(a) $\lim\limits_{(x,y)\to(0,0)} f(x,y)$ depends upon the path.

(b) $\lim\limits_{(x,y)\to(0,0)} f(x,y)$ does not exist.

(c) $f(x,y)$ is continuous at point (0,0).

(d) $f(x,y)$ is discontinuous at point (0,0).

Q.11 If $z=\tan^{-1}(x/y)$ then $(\partial z/\partial y)=?$

(a) $\dfrac{-y}{x^2+y^2}$ (b) $\dfrac{x}{x^2+y^2}$ (c) $\dfrac{y}{x^2+y^2}$ (d) $\dfrac{-x}{x^2+y^2}$

Q.12 If $u=\left(xz+\dfrac{x}{z}\right)^y, z\neq 0$ then $(\partial u/\partial y)=?$

(a) $\left(xz+\dfrac{x}{z}\right)^y \ln\left(xz+\dfrac{x}{z}\right)$ (b) $y\left(xz+\dfrac{x}{z}\right)^{y-1}\left(z+\dfrac{1}{z}\right)$

(c) $y\left(xz+\dfrac{x}{z}\right)^{y-1}\left(x-\dfrac{x}{z^2}\right)$ (d) $y\left(xz+\dfrac{x}{z}\right)^{y-1}$

Q.13 Which of the following is not a homogeneous function?

(a) $u=\dfrac{x^3+y^3}{x-y}$ (b) $u=\dfrac{x^4+y^4}{y+1}$

(c) $u=\dfrac{x^2+y^2}{x-y}$ (d) $u=\dfrac{x^2+y^2}{x^3-y^3}$

Q.14 For the function $u=\sin^{-1}\left(\dfrac{x^3+y^3}{x-y}\right)$, which option is true?

(a) $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=u$ (b) $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=\tan u$

(c) $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=2u$ (d) $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=2\tan u$

Q.15 If for a homogeneous function $u(x,y)$;

$x^2\dfrac{\partial^2 u}{\partial x^2}+2xy\dfrac{\partial^2 u}{\partial x\partial y}+y^2\dfrac{\partial^2 u}{\partial y^2}=2u$, then the degree of $u(x,y)$ is:

(a)6 (b)3 (c)2 (d) None of these.

Q.No.	10	11	12	13	14	15
Option						

Note: Answer all questions. Each question carries 1 mark. There will be no negative marking.

Q.1. The value of c of Cauchy's mean value theorem for the functions $f(x)=x^2$, $g(x)=x^3$ in the interval [1, 2] is

(a) 3/14 (b) 14/9 (c) 17/9 (d) 5/14

Q.2. A system of equation AX=B, B is non-zero, have no solution if (with usual notations)

a. $r(A)=r(c)$ b. $r(A)=r(c)<n$

c. $r(A)=r(c)=n$ d. N.O.T.

Q.3. The system of equation 2x-y=3,x-3y=4,x+2y=1 has

a. Unique solution b. Infinite many solutions

c. No solution d. N.O.T.

Q.4. The rank r of a matrix whose order is 3x2

a. 0<r<3 b. 0<r<2

c. $0\le r\le 2$ d. $0\le r\le 3$

Q.5. If the Eigen values of a matrix A are 1, 1,-1 than the determinant of another matrix B is; where

$B=A^2+2A-I$

(a) -8 (b) 8 (c) 3 (d) -3

Q.6. Taylor's series expansion of f(x) about x=a is

a) $f(a)-(x-a)f'(a)+\frac{(x-a)^2}{2!}f''(a)+\cdots(-1)^n\frac{(x-a)^n}{n!}f^n(a)$

b) $f(a)+(x-a)^2f'(a)+\frac{(x-a)^3}{3!}f''(a)+\frac{(x-a)^4}{4!}f'''(a)+\cdots$

c) $f(a)+(x-a)f'(a)+\frac{(x-a)^2}{2!}f''(a)+\frac{(x-a)^3}{3!}f'''(a)+\cdots$

d) $f(a)+xf'(a)+x^2f''(a)+x^3f'''(a)$

Q.7. Rolle's theorem for f(x)=|sin x| in [0, π] is

(a) Applicable (b) Applicable and $c=0$

(c) Not applicable due to non-differentiability

(d) Not applicable due to discontinuity

Q.8. For : $y=3\ln(x^2)$.

(a) $\frac{dy}{dx}=\frac{82}{x^7}$ (b) $\frac{dy}{dx}=\frac{6}{x}$

(c) $\frac{dy}{dx}=\frac{12}{x^6}$ (d) $\frac{dy}{dx}=\frac{21}{x}$

Q. 9. The value of $\frac{dy}{du}$ if $y=-x^2+2x$ and $u=2x$

(a) $\frac{dy}{du}=1-2u$ (b) $\frac{dy}{du}=2u-1$

(c) $\frac{dy}{du}=-\frac{1}{2}u+1$ (d) None of these

Q. 10. If $f(x)=-8x^2-4\cos x$

(a). $f'(x)=-8x+4\sin x$

(b) $f'(x)=-16x-4\sin x$

(c). $f'(x)=-16x+4\sin x$ (d). None of these

Q.11. The value of the $\int\log x dx$ is

(a) $x\log x+x+c$ (b) $\log x+x+c$

(c) $x\log x-x+c$ (d) None of these

Q.12. The solution of the system of equation x+y+z=3; 2x+y-z=2; 5x+6y-z=14

(a) x=0,y=1,z=2 (b) x=1,y=1,z=1

(c) x=1,y=2,z=3 (d) N.O.T.

Q.13. The value of the integral $\int_1^2\frac{x}{(1+x)(x+2)}$ is

(a) $\log\left(\frac{27}{32}\right)$ (b) $\log\left(\frac{32}{27}\right)$

(c) $-\log\left(\frac{32}{27}\right)$ (d) N.O.T

Q.14. The sum of Eigen values of the matrix

$$\begin{bmatrix}3&4&3&0\\0&4&1&2\\0&0&3&1\\0&0&0&3\end{bmatrix}$$

a. 13 b. 108

c. -13 d. N.O.T.

Q.15. The value of c of Lagrange's mean value theorem for the function $f(x)=2x^2$ in [1, 5] is

a. 2 b. 4 c. 6 d. None of these

Q.1. The area of a region R can be calculated by

a. $\iint_R f(x,y)\,dx\,dy$ b. $\iint_R dx\,dy$

c. $\iint_R dr\,d\theta$ d. N.O.T.

Q.2. The area of the curve bounded by
$x+y=1;\ x=0;\ y=0$

a. 1 b. -1
c. ½ d. -1/2

Q.3. The area of the curve bounded by
$x=y^2, y=x^2$

a. 1 b. 1/3 c. 1/2 d. N.O.T.

Q.4. The value of the integration $\int_{-a}^{a}\int_{0}^{\sqrt{a^2-x^2}} dxdy$

a. $\pi a^2/2$ b. $\pi a^2/4$ c. πa^2 d. N.O.T.

Q.5. The integral $\int_{0}^{1}\int_{x^2}^{\sqrt{x}} f(x,y)dydx$ is look as

a. $\int_{0}^{1}\int_{y^2}^{\sqrt{y}} f(x,y)dxdy$ b. $\int_{0}^{1}\int_{0}^{\sqrt{y}} f(x,y)dxdy$

c. $\int_{0}^{1}\int_{y}^{\sqrt{y}} f(x,y)dxdy$ d. N.O.T.

Q.6. For changing (x,y,z) coordinate system into spherical coordinate system, the value of dxdydz is

(a). $dr d\theta d\phi$ (b). $r dr d\theta d\phi$

(c) $r^2 dr d\theta d\phi$ (d) $r^2 \sin\theta dr d\theta d\phi$

Q.7. For changing (x,y,z) to (r,θ,ϕ)

a. $J=r^2\sin\theta$ b. $J=r\sin\theta$

c. $J=r^2\cos\theta$ d. N.O.T.

Q.8. The area/volume of a region can be calculated by

a. Integration b. Differentiation
c. Both d. N.O.T.

Q. 9. For changing (x,y,z) to (r,θ,ϕ)

a. $z=r\sin\theta$ b. $z=r\cos\theta$
c. $z=r\sin\theta\sin\phi$ d. N.O.T.

Q.10. The limits of the integration for
$\iiint_R f(x,y,z)dxdydz;\ R: \textit{is the region bounded by}$
$y=x^2, x=y^2, z=0, z=3$

(a) $z=0, z=3;\ y=x^2, y=\sqrt{y};\ x=-1, x=1$

(b) $z=0, z=3;\ y=x^2, y=\sqrt{y};\ x=0, x=1$

(c) $z=0, z=3;\ y=x^2, y=\sqrt{x};\ x=0, x=1$

(d) $z=0, z=3;\ y=x^2, y=\sqrt{x};\ x=-1, x=1$

Q.11. $\int_0^1\int_0^1\int_0^1 xyz\ dxdydz =$

a. 1 b. 1/2 c. 2/16 d. N.O.T.

Q.12. The integral $\iiint_V dxdydz$ represents.

a. Area b. Volume
c. Surface area d. N.O.T.

Q.13. The value of the integration

$\int_0^1\int_0^1 (x^2+y^2)dxdy$

a. 2/3 b. -2/3 c. 3 d. N.O.T.

Q.14. The limits of the integration for
$\iiint_R f(x,y,z)dxdydz;\ R: \textit{is the region bounded by}$

$x+y+z=1, x=0, y=0, z=0$

(a) $z=0, z=1-x-y;\ y=0, y=1-x, x=-1, x=1$

(b) $z=0, z=1-x-y;\ y=-1, y=1-x, x=0, x=1$

(c) $z=0, z=1-x-y;\ y=0, y=1-x, x=0, x=1$

(d) N.O.T.

Q. 15. For changing (x,y,z) to (r,θ,ϕ)

a. $x=r\sin\theta\cos\phi$ b. $x=r\sin\theta\sin\phi$

c. $x=\sin\theta\sin\phi$ d. N.O.T.

Note: Answer all questions. Each question carries 1 mark. There will be no negative marking.

Q.1. The area of the curve bounded by $(0.0),(1,1),(1,0)$

a. 1 b. $1/2$ c. $3/2$ d. N.O.T.

Q.2. The value of the integration $\int_0^1\int_{x^2}^{2-x} xy\,dy\,dx$

a. $3/4$ b. $3/8$ c. $3/5$ d. N.O.T.

Q.3. The limits of the integration for

$\iiint_R f(x,y,z)dxdydz;\ R: is\ the\ region\ bounded\ by$

$x+y+z=1, x=0, y=0, z=0$

a. $z=0, z=1-x-y;\ y=0, y=1-x, x=-1, x=1$

b. $z=0, z=1-x-y;\ y=-1, y=1-x, x=0, x=1$

c. $z=0, z=1-x-y;\ y=0, y=1-x, x=0, x=1$

d. N.O.T.

Q.4. The limits of the integration for

$\iiint_R f(x,y,z)dxdydz;\ R: is\ the\ region\ bounded\ by$

$y=x^2, x=y^2, z=0\ to\ z=3$

a. $z=0, z=3;\ y=x^2, y=\sqrt{y};\ x=-1,\ x=1$

b. $z=0, z=3;\ y=x^2, y=\sqrt{y};\ x=0,\ x=1$

c. $z=0, z=3;\ y=x^2, y=\sqrt{x};\ x=0,\ x=1$

d. $z=0, z=3;\ y=x^2, y=\sqrt{x};\ x=-1,\ x=1$

Q.5. $\int_0^1\int_0^1\int_0^1 xyz\ dxdydz =$

a. 1 b. $1/2$ c. $2/16$ d. N.O.T.

Q.6. For changing (x,y,z) coordinate system into Cylindrical coordinate system

a. $x=r\sin\phi$ b. $x=r\cos\phi$

c. $x=r\sin\theta\cos\phi$ d. N.O.T.

Q.7. For changing (x,y,z) coordinate system into Cylindrical coordinate system

a. $J=r$ b. $J=r^2\sin\theta$

c. $J=r\sin\theta$ d. N.O.T.

Q.8 The integral $\iiint_V dxdydz$ represents.

a. Area b. Volume c. Surface area d. N.O.T.

Q. 9. The integral $\int_0^1\int_{x^2}^{\sqrt{x}} f(x,y)dydx$ is look as

a. $\int_0^1\int_{y^2}^{\sqrt{y}} f(x,y)dxdy$ b. $\int_0^1\int_0^{\sqrt{y}} f(x,y)dxdy$

c. $\int_0^1\int_y^{\sqrt{y}} f(x,y)dxdy$ d. N.O.T.

Q. 10. The value of the integration $\int_{-a}^{a}\int_0^{\sqrt{a^2-x^2}} dxdy$

a. $\pi a^2/2$ b. $\pi a^2/4$ c. πa^2 d. N.O.T.

Q.11. $\int_0^1\int_0^1\int_0^1 x^2y^2z^2\ dxdydz =$

a. 1 b. $1/2$ c. $2/16$ d. N.O.T.

Q.12 The area/volume of a region can be calculated by

a. Integration b. Differentiation

c. Both d. N.O.T.

Q.13. The integral $\iiint_V dxdydz$ represents.

a. Area b. Volume c. Surface area d. N.O.T.

Q.14. The value of the integration $\int_0^1\int_0^1 (x^2+y^2)dxdy$

a. $2/3$ b. $-2/3$ c. 3 d. N.O.T.

Q.15. For changing (x,y,z) coordinate system into Cylindrical coordinate system

a. $z=z$ b. $z=r$

c. $z=\phi$ d. N.O.T.

Note: Answer all questions. Each question carries 1 mark. There will be no negative marking.

Q.1. The minimum value of the function x^2+y^2 under the condition $x+y=1$ is

a. 0 b. 1 c. -1 d. No minimum value

Q.2. The drawback of Lagrange method is

(a) It is unable to find stationary point
(b) It is unable to find extrema value of the function
(c) It is unable to find the nature of stationary point
(d) None of these

Q.3. The value of the $\lim_{(x,y)\to(0,0)} \frac{y^2-x^2}{x^2+y^2}$

a. 0 b. 1 c. -1 d. Not exist

Q.4. The value of the $\lim_{(x,y)\to(1,2)} \frac{3x^2y}{x^2+y^2+5}$

a. 3/5 b. 1/5 c. 0 d. Not exist

Q.5. The function $\frac{x+y}{\sqrt{x^3+y^3}}$ at (0,0)

a. Continuous b. Differential
c. Limit exist d. None of these

Q.6. The necessary condition for differentiability of a function f(x,y) at (a,b) is

(a) Both the partial derivative fx and fy exist
(b) fx exist
(c) fy exist (d) None of these

Q.7. If $x^x y^y z^z = c$ then the value of $\partial z/\partial x$ at x=y=z is

a. 1 b. -1 c. 0 d. 1/2

Q.8. If $x^x y^y z^z = c$ then the value of $\partial z/\partial y$ at x=y=z is

a. 1 b. -1 c. 0 d. 1/2

Q.9. If $z=\log(e^x+e^y)$ then the value of $rt-s^2$ is

a. 1 b. -1 c. 0 d. None of these

Q.10. If $u=\frac{x^{1/3}+y^{1/3}}{x^{1/2}+y^{1/2}}$; then value of $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=$

a. u/3 b. -u/3 c. u/6 d. -u/6

Q.11 If $u=\log\left(\frac{x^4+y^4}{x+y}\right)$; then value of

$x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}=$

a. 3 b. -4 c. 4 d. None of these

Q. 12. Which of the following function is not homogenous?

a. x^2+y^2-xy b. $\frac{x^2+y^2}{x-y}$

c. $\log\left(\frac{x^2+y^2}{x-y}\right)$ d. $Sin^{-1}\left(\frac{x^2+y^2}{x^2-yx}\right)$

Q. 13. If $u=\sin^{-1}\left(\frac{y}{x}\right)+\tan^{-1}\left(\frac{y}{x}\right)$; then value of

$x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=$

a. 0 b. 1 c. -1 d. None of these

Q.14. If $z=x^2y^2$; $x=t$; $y=2t$ then $\partial z/\partial t$ is

a. 2xy(2x-y) b. xy(2x+y)
c. 2xy(x+2y) d. 2xy(2x+y)

Q.15. If $z=x+y$; $x=2t$; $y=t^2$ then $\partial z/\partial t$ is

a. 2+2t b. 2-2t c. 2t-2 d. 2t+5

Note: Answer all questions. Each question carries 1 mark. There will be no negative marking.

Q.1. The stationary point for the function x^3+y^3-3xy

a. (0,0) b. (1,1)
c. (-1,-1) d. both (a) and (b)

Q.2. The drawback of Lagrange method is
(a) It is unable to find stationary point
(b) It is unable to find extrema value of the function
(c) It is unable to find the nature of stationary point
(d) None of these

Q.3. The value of the $\lim_{(x,y)\to(0,0)} \dfrac{2x^2+y}{4x^2-y}$

a. 0 b. 1 c. -1 d. Not exist

Q.4. The value of the $\lim_{(x,y)\to(1,2)} \dfrac{x^2+\sqrt{y}}{\sqrt{x^2+y}}$

a. 3/5 b. 1/5 c. 0 d. ~~Not exist~~ Non of these

Q.5. The function $\dfrac{x^2+\sqrt{y}}{\sqrt{x^2+y}}$ at (0,0)

a. Continuous b. Differential
c. Limit exist d. None of these

Q.6. The necessary condition for differentiability of a function f(x,y) at (a,b) is
(a) Both the partial derivative fx and fy exist
(b) fx exist
(c) fy exist (d) None of these

Q.7. If $x^x y^y z^z = c$ then the value of $\partial y/\partial x$ at x=y=z is

a. 1 b. -1 c. 0 d. 1/2

Q.8. If $x^x y^y z^z = c$ then the value of $\partial y/\partial z$ at x=y=z is

a. 1 b. -1 c. 0 d. 1/2

Q.9. If $z=\sqrt{xy}$ then the value of $\dfrac{\partial^2 z}{\partial x \partial y}$ is

a. 1/4z b. -1/4z c. 4z d. -4z

Q.10. If $u=\dfrac{x^{1/3}+y^{1/3}}{x^{1/2}+y^{1/2}}$; then value of $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=$

a. u/3 b. –u/3 c. u/6 d. –u/6

Q.11 If $u=\log\left(\dfrac{\sqrt{x^4+y^4}}{x^2-y^2}\right)$; then value of

$x^2\dfrac{\partial^2 u}{\partial x^2}+2xy\dfrac{\partial^2 u}{\partial x \partial y}+y^2\dfrac{\partial^2 u}{\partial y^2}=$

a. -1 b. 1 c. 2 d. None of these

Q. 12. Which of the following function is not homogenous?

a. x^2+y^2-xy b. $\dfrac{x^2+y^2}{x-y}$

c. $\cos^{-1}\left(\dfrac{x^2+y^2}{x-y}\right)$ d. $\exp\left(\dfrac{x^2+y^2}{x^2-yx}\right)$

Q. 13. If $u=\log\left(\dfrac{y}{x}\right)+\exp\left(\dfrac{y}{x}\right)$; then value of

$x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=$

a. 0 b. 1 c. -1 d. None of these

Q.14. If $z=x^2+y^2$; $x=r\cos\theta$; $y=r\sin\theta$ then $\partial z/\partial r$ is

a. r b. -r
c. 2r d. -2r

Q.15. If $z=u^2+v^2$; $u=at^2$; $v=2at$ then dz/dt is

a. 4at(t²+2) b. at(t²+2)
c. a²t(t²+2) d. 4a²t(t²+2)

Note: Answer all questions. Each question carries 1 mark. There will be no negative marking.

Q.1. The value of c of Cauchy's mean value theorem for the functions $f(x)=x^2$, $g(x)=x^3$ in the interval [1, 2] is

(a) 3/14 (b) 14/9 (c) 17/9 (d) 5/14

Q.2. A system of equation AX=B, B is non-zero, have no solution if (with usual notations)

a. $r(A)=r(c)$ b. $r(A)=r(c)<n$

c. $r(A)=r(c)=n$ d. N.O.T.

Q.3. The system of equation 2x-y=3,x-3y=4,x+2y=1 has

a. Unique solution b. Infinite many solutions

c. No solution d. N.O.T.

Q.4. The rank r of a matrix whose order is 3x2

a. 0<r<3 b. 0<r<2

c. $0\le r\le 2$ d. $0\le r\le 3$

Q.5. If the Eigen values of a matrix A are 1, 1,-1 than the determinant of another matrix B is; where

$B=A^2+2A-I$

(a) -8 (b) 8 (c) 3 (d) -3

Q.6. Taylor's series expansion of f(x) about x=a is

a. $f(a)-(x-a)f'(a)+\frac{(x-a)^2}{2!}f''(a)+\cdots(-1)^n\frac{(x-a)^n}{n!}f^n(a)$

b. $f(a)+(x-a)^2f'(a)+\frac{(x-a)^3}{3!}f''(a)+\frac{(x-a)^4}{4!}f'''(a)+\cdots$

c. $f(a)+(x-a)f'(a)+\frac{(x-a)^2}{2!}f''(a)+\frac{(x-a)^3}{3!}f'''(a)+\cdots$

d. $f(a)+xf'(a)+x^2f''(a)+x^3f'''(a)$

Q.7. Rolle's theorem for f(x)=|sin x| in [0, π] is

(a) Applicable (b) Applicable and $c=0$

(c) Not applicable due to non-differentiability

(d) Not applicable due to discontinuity

Q.8. For : $y=3\ \text{In}(x^2)$.

(a) $\frac{dy}{dx}=\frac{82}{x^7}$ (b) $\frac{dy}{dx}=\frac{6}{x}$

(c) $\frac{dy}{dx}=\frac{12}{x^6}$ (d) $\frac{dy}{dx}=\frac{21}{x}$

Q. 9. The value of $\frac{dy}{du}$ if $y=-x^2+2x$ and $u=2x$

(a) $\frac{dy}{du}=1-2u$ (b) $\frac{dy}{du}=2u-1$

(c) $\frac{dy}{du}=-\frac{1}{2}u+1$ (d) None of these

Q. 10. If $f(x)=-8x^2-4\cos x$

(a). $f'(x)=-8x+4\sin x$

(b) $f'(x)=-16x-4\sin x$

(c). $f'(x)=-16x+4\sin x$ (d).None of these

Q.11. The value of the $\int\log x dx$ is

(a) $x\log x+x+c$ (b) $\log x+x+c$

(c) $x\log x-x+c$ (d) None of these

Q.12. The solution of the system of equation x+y+z=3; 2x+y-z=2; 5x+6y-z=14

(a) x=0,y=1,z=2 (b) x=1,y=1,z=1

(c) x=1,y=2,z=3 (d) N.O.T.

Q.13. The value of the integral $\int_1^2\frac{x}{(1+x)(x+2)}$ is

(a) $\log\left(\frac{27}{32}\right)$ (b) $\log\left(\frac{32}{27}\right)$

(c) $-\log\left(\frac{32}{27}\right)$ (d) N.O.T

Q.14. The sum of Eigen values of the matrix

$$\begin{bmatrix}3&4&3&0\\0&4&1&2\\0&0&3&1\\0&0&0&3\end{bmatrix}$$

a. 13 b. 108

c. -13 d. N.O.T.

Q.15. The value of c of Lagrange's mean value theorem for the function $f(x)=2x^2$ in [1, 5] is

a. 2 b. 4 c. 6 d. None of these