A. G. High School and G. & D. Parikh Higher Secondary School

Navrangpura, Ahmedabad - 380 009.

Third Semister Exam - 2014

Date	: 15-09-2014	Std. : 12		Marks	: 100
Day	: Monday	Subject : Maths		Time	: 2:30 Hrs.

Instructions :

1. **This question paper contain 64 questions. All are compulsory.**
2. **Figure to the right indicates full marks of the respective question**
3. **Select proper option to make the statement correct.**

Section - A : (01 Mark Each)

1. $S=\{(m,n)/m=kn,k\in N\}$ then S is _____ Reltiaon.

   (A) Reflerave and Symmetric (B) Reflexive and Tansitive
   (C) Symmetric and Transitive (D) Equivalence

2. Let S be a relation on N defined by $S=\{(x,y)/x+2y=8\}$ then Range of S is ____

   (A) $\{7/2,3,5/2,2,3/2,1\}$ (B) $\{3/2,5/2,7/2\}$
   (C) $\{1, 2, 3\}$ (D) $\{2, 4, 6\}$

3. If $f(x)=\frac{x}{x-1}, x\neq 1$, then $(fofof...\ of)_{9\text{ times}}$ = _____

   (A) $x/x-1$ (B) x
   (C) $\left(\frac{x}{x-1}\right)^9$ (D) x^9

4. $f:R\to R$, $g:R\to R$ and $f(x)=2x-3$, $g(x)=x^3+5$ then $g^{-1}of^{-1}(x)$ = _____

   (A) $\left(\frac{x+7}{2}\right)^{1/3}$ (B) $\left(x-7/2\right)^{1/3}$
   (C) $\left(\frac{x-2}{7}\right)^{1/3}$ (D) $\left(\frac{x-7}{2}\right)^{1/3}$

5. For the function $f(x)=\frac{3^x+3^{-x}}{2}$, then $f(x+y)+f(x-y)$ = _____

   (A) $f(x)+f(y)$ (B) $f(x)-f(y)$
   (C) $\frac{f(x)}{g(x)}$ (D) $2f(x)g(x)$

6. $cos^{-1}\left(cos\,7\pi/6\right)$ = _____

   (A) $\pi/6$ (B) $5\pi/6$
   (C) $-\pi/6$ (D) $7\pi/6$

7. $\sin\left(\tan^{-1}\left(\tan\frac{13\pi}{6}\right)\right)+\cos\left(\cos^{-1}\left(\cos\frac{\pi}{3}\right)\right) =$ _____

(A) -1 (B) 0

(C) 1 (D) $\frac{\pi}{2}$

8. $\sin\left(3\cos^{-1}\frac{4}{5}\right) =$ _____

(A) $\frac{117}{125}$ (B) $\frac{99}{125}$

(C) $-\frac{99}{125}$ (D) $-\frac{117}{125}$

9. $\sec^{-1}\left(\operatorname{cosec}\frac{\pi}{8}\right) =$ _____

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{8}$

(C) $\frac{3\pi}{4}$ (D) $\frac{3\pi}{8}$

10. $\cos\left(\frac{\pi}{3}+\cos^{-1}(-1)\right) =$ _____

(A) $\frac{1}{2}$ (B) $-\frac{1}{2}$

(C) 1 (D) -1

11. $\sin\left(2\tan^{-1}x\right)=1$, then $x =$ _____

(A) $\sqrt{3}$ (B) 1

(C) $\frac{1}{2}$ (D) $\frac{1}{\sqrt{2}}$

12. $\begin{vmatrix} -1 & 3 & 4 \\ 1 & 9 & 12 \\ 9 & 9 & 12 \end{vmatrix} =$ _____

(A) 0 (B) 1

(C) -1 (D) 15

13. $\begin{vmatrix} x & y & z \\ -x & y & z \\ -x & -y & z \end{vmatrix} = kxyz$, then $k =$ _____

(A) 4 (B) 0

(C) 2 (D) 3

14. $\begin{vmatrix} 2 & 3 \\ 1 & 4x \end{vmatrix} = \begin{vmatrix} 2x & -1 \\ 5 & x \end{vmatrix}$, then $x =$ _____

(A) 2 (B) 3

(C) 4 (D) 6

15. $A=\begin{bmatrix}10 & -2\\ -5 & 1\end{bmatrix}$, then $A^{-1}=$ _____

(A) $\begin{bmatrix}1 & 2\\ 5 & 10\end{bmatrix}$ (B) $\begin{bmatrix}10 & 5\\ 2 & 1\end{bmatrix}$

(C) $\begin{bmatrix}-1 & -2\\ -5 & -10\end{bmatrix}$ (D) Not exist

16. $\cos ec\theta\begin{bmatrix}-\cos ec\theta & -\cot\theta\\ \cot\theta & -\cos ec\theta\end{bmatrix}+\cot\theta\begin{bmatrix}\cot\theta & \cos ec\theta\\ -\cos ec\theta & \cot\theta\end{bmatrix}=$ _____

(A) $\begin{bmatrix}-1 & 0\\ 0 & 1\end{bmatrix}$ (B) $\begin{bmatrix}1 & 0\\ 0 & -1\end{bmatrix}$

(C) $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$ (D) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

17. $A=\begin{bmatrix}1/2 & 1/2\\ 1/2 & 1/2\end{bmatrix}$, then $A^2=$ _____

(A) I (B) A

(C) $\begin{bmatrix}1/2 & 1/2\\ 1/2 & 1/2\end{bmatrix}$ (D) Not possible

18. $A=\begin{bmatrix}5 & 2x+3\\ x-2 & x+1\end{bmatrix}$ is Symmetric Matrix then $x=$ _____

(A) 4 (B) 5

(C) -5 (D) -4

19. $I=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, $J=\begin{bmatrix}0 & 1\\ -1 & 0\end{bmatrix}$ and $B=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$, then $B=$ _____.

(A) $I\cos\theta+J\sin\theta$ (B) $I\sin\theta+J\cos\theta$

(C) $I\cos\theta-J\sin\theta$ (D) $-I\cos\theta+J\sin\theta$

20. $A=\begin{bmatrix}8 & 3\\ 5 & 2\end{bmatrix}$, then $A.adj\,A=$ _____

(A) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ (B) $\begin{bmatrix}0 & -1\\ -1 & 0\end{bmatrix}$

(C) $\begin{bmatrix}0 & 0\\ 0 & 0\end{bmatrix}$ (D) None of these

21. $f(x)=\begin{cases}\frac{x^2-x-6}{x-3} & ; x\neq 3\\ 6 & ; x=3\end{cases}$, then f(x) is _____ at $x=3$.

(A) Contineous (B) Discontineous
(C) Not exist (D) None of these

22. $\frac{d}{dx}\left(e^{-4\log(1+x)}\right)=$ _____

(A) $\frac{1}{(1+x)^4}$ (B) $(1+x)^4$

(C) $\frac{-4}{(1+x)^5}$ (D) $\frac{5}{(1+x)^4}$

23. $f(x)=\begin{cases}\frac{x^k-2^k}{x-2} & ; x\neq 2\\ 448 & ; x=2\end{cases}$, is contineous at $x=2$, then $k=$ _____

(A) 5 (B) 7
(C) 8 (D) 9

24. $\frac{d}{dx}\cos^{-1}(\sin x)=$ _____ ; $(0<x<\pi)$

(A) 1 (B) -1
(C) $\frac{1}{2}$ (D) 0

25. $\int\frac{1}{25-9x^2}dx=$ _____ $+C$

(A) $-\frac{1}{30}\log\left|\frac{5-3x}{5+3x}\right|$ (B) $-\frac{1}{30}\sin^{-1}\left(\frac{3x}{5}\right)$

(C) $\frac{1}{30}\log\left|\frac{5-3x}{5+3x}\right|$ (D) $\frac{1}{30}\tan^{-1}\left(\frac{3x}{5}\right)$

26. $\int\frac{1}{x\sqrt{4+\log x}}dx=$ _____ $+C$

(A) $2\sqrt{4+\log x}$ (B) $\frac{2}{\sqrt{4+\log x}}$

(C) $\log(4+\log x)$ (D) $\sqrt{4+\log x}$

27. $f(x)dx=\frac{(\log x)^5}{5}+C$, then $f(x)=$ _____

(A) $\frac{\log x}{4}$ (B) $\frac{(\log x)^4}{4}$

(C) $\frac{(\log x)^4}{x}$ (D) $(\log x)^4$

28. $\int e^{tanx} sec^2 x\,dx =$ _____ $+ C$

(A) e^{tanx} (B) e^{sinx}

(C) $tanx$ (D) $sinx$

29. $\int 5^{5^x} \cdot 5^x\,dx =$ _____ $+ C$

(A) $(log\,5)^2 \cdot 5^{5^x}$ (B) $(log\,5) \cdot 5^{5^x}$

(C) 5^{5^x} (D) $\frac{5^{5^x}}{(log\,5)^2}$

30. $\int x^{7x}(1+log\,x)dx =$ _____ $+ C$

(A) $\frac{x^{6x}}{6}$ (B) $\frac{x^{7x}}{7}$

(C) $\frac{x^{8x}}{8}$ (D) x^x

31. $P(A)=0.45, P(B) = 0.35$ and $P(A \cup B) = 0.65$ then $P\left(\frac{B}{A}\right) =$ _____

(A) $\frac{3}{7}$ (B) $\frac{1}{3}$

(C) $\frac{3}{13}$ (D) $-\frac{3}{7}$

32. A balanced die is rolled, If outcome is an odd, what is the probability their it is prime ?

(A) $\frac{1}{3}$ (B) $\frac{4}{3}$

(C) 1 (D) $\frac{2}{3}$

33. For the events A and B, $P(A) = \frac{1}{4}$, $P\left(\frac{A}{B}\right) = \frac{1}{2}$, $P\left(\frac{B}{A}\right) = \frac{2}{3}$ then $P(B) =$ _____

(A) $\frac{1}{2}$ (B) $\frac{1}{6}$

(C) $\frac{1}{3}$ (D) $\frac{2}{3}$

34. If A and B are exhaustive and independent events and $P(A)=0.2$ then $P(B) =$ _____.

(A) 0.8 (B) 0.3

(C) 1 (D) 0.5

35. Probability distribution for random varialbe x is

$x=x$	0	1	2	3	4
$p(x=x)$	0.2	0.1	0.2	0.3	0.2

then $P(x \geq 3) =$ _____

(A) 0.7 (B) 0.8

(C) 0.5 (D) 0.4

36. If mean and standard deviation for binomial random variable x is 8 and 2 respectively then $P(x=0) =$ _____.

(A) $1/2^4$ (B) $1/2^6$

(C) $1/2^{16}$ (D) $1/2^8$

37. Range of Random Variable is _____

(A) Z (B) Q

(C) N (D) R

38. $P(B)=0.1$, then $P(B/U) =$ _____

(A) 0.1 (B) 0.2

(C) 0.5 (D) 10

39. Objective function of an LP problem is _____

(A) a constant (B) a function to be optimized

(C) an inequality (D) a quadratic equation

40. Which of the following is not a vertex of the feasible region bounded by the constraints $2x+3y \le 6$, $5x+3y \le 15$ and $x \ge 0$, $y \ge 0$.

(A) $(0, 2)$ (B) $(0, 0)$

(C) $(3, 0)$ (D) $(0, 5)$

Section - B : 2 Marks Each

41. $f:[-1, 1] \to [-1, 1]$, $f(x) = x|x|$, is _____

(A) One-one & onto (B) many-one & onto

(C) one-one but not onto (D) many-one & not onto

42. Domain of the function $f(x) = \frac{x}{4-x^2} + log_{10}(x^2-1)$

(A) $R - \{-2, 2\}$ (B) $R - (-1, 1)$

(C) $(-\alpha, -2) \cup (-2, -1) \cup (1, 2) \cup (2, \alpha)$ (D) $(-\alpha, -2) \cup (2, \alpha)$

43. $f, g: R \to R$, $f(x) = x^2$ and $g(x) = 2^x$, then $\{x / fog(x) = gof(x)\} =$ _____

(A) $\{0\}$ (B) $\{0, 1\}$

(C) R (D) $\{0, 2\}$

44. $sin^{-1}(1-x) - 2\,sin^{-1}x = \pi/2$, then $x =$ _____

(A) $0, 1/2$ (B) $1, 1/2$

(C) 0 (D) $1/2$

45. If $sin^{-1}x - cos^{-1}x < 0$, then _____

(A) $-1 \le x < 1/\sqrt{2}$ (B) $-1 < x < 0$

(C) $-1 \le x < 1/2$ (D) $-1 \le x < \sqrt{3}/2$

46. If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=3\pi$, then $xy+yz+zx=$ _____

(A) 1 (B) 0
(C) -3 (D) 3

47. $\begin{vmatrix} a+bx & d+ex & p+qx \\ ax+b & dx+e & px+q \\ c & f & r \end{vmatrix} = k \begin{vmatrix} a & d & p \\ b & e & q \\ c & f & r \end{vmatrix}$, then $k=$ _____

(A) 0 (B) x^2
(C) $1-x^2$ (D) $1+x^2$

48. Solution of $2x+3y=8$ and $5x-4y+3=0$ is _____

(A) (1, 2) (B) (-1, -2)
(C) (2, 1) (D) (2, 3)

49. If $A=\begin{bmatrix} 3 & 1 \\ -9 & 3 \end{bmatrix}$, then $I+2A+3A^2+.....\alpha=$ _____

(A) $\begin{bmatrix} 9 & 1 \\ -9 & 0 \end{bmatrix}$ (B) $\begin{bmatrix} 4 & 1 \\ -9 & -1 \end{bmatrix}$

(C) $\begin{bmatrix} 7 & 2 \\ -18 & -5 \end{bmatrix}$ (D) $\begin{bmatrix} 7 & 2 \\ -5 & -18 \end{bmatrix}$

50. If f is an even function and $f'(x)$ is define then $f'(\pi)+f'(-\pi)=$ _____

(A) 0 (B) ≤ 0
(C) ≥ 0 (D) > 0

51. $f(x)=\dfrac{\sin 2x-\tan 2x}{x^3}$, $x\neq 0$ and $f(0)=k$, If f is contineious at $x=0$, then $k=$ _____.

(A) 4 (B) -8
(C) -4 (D) 8

52. $\int \dfrac{\log(x+1)-\log}{x(x+1)}dx =$ _____ $+C$

(A) log - log (x+1) (B) log (x+1)-logx

(C) $\left(\log\left(\dfrac{x+1}{x}\right)\right)^2$ (D) $-\left(\log\left(\dfrac{x+1}{x}\right)\right)^2$

53. A and B are indenpendent events. Probabiliyt that both A and B occur is $\frac{1}{8}$.

Probability that neither of them occur is $\frac{3}{8}$, then probability of A is _____

(A) $\frac{3}{4}$ (B) $\frac{1}{3}$
(C) $\frac{1}{4}$ (D) $\frac{2}{3}$

54. Maximize $Z=3x+4y$ subject to $x+y \le 4, x \ge 0, y \ge 0$ is _____

(A) 4 (B) 0
(C) 16 (D) 3

55. The region represented by $x \ge 0, y \ge 0, y \le 6, x+y \le 3$ is _____

(A) Unbounded in first quadrant (B) Unbounded in first and second quadrant
(C) bounded in first quadrant (D) None of these

Section - C : 3 Marks Each

56. If $f(x)=\log\left(\frac{1+x}{1-x}\right)$ and $g(x)=\log\frac{3x+x^3}{1+3x^2}$, then $fog\,(x)$ = _____

(A) $-f(x)$ (B) $3f(x)$
(C) $(f(x))^3$ (D) $-3f(x)$

57. $\begin{vmatrix} \frac{a^2+b^2}{c} & c & c \\ a & \frac{b^2+c^2}{a} & a \\ b & b & \frac{c^2+a^2}{b} \end{vmatrix} = kabc$, then k = _____

(A) 4 (B) 3
(C) 2 (D) 1

58. $x=\tan\theta+\cot\theta,\ y=2\log(\cot\theta)$, then $\frac{dy}{dx}$ = _____

(A) $-\tan 2\theta$ (B) $\tan 2\theta$
(C) $\sin 2\theta$ (D) $\cos 2\theta$

59. $\int \frac{dx}{(x-1)^{3/2}(x-2)^{1/2}}$ = _____ $+C$

(A) $2\sqrt{\frac{x-1}{x-2}}$ (B) $\sqrt{\frac{x-1}{x-2}}$
(C) $2\sqrt{\frac{x-2}{x-1}}$ (D) $\sqrt{\frac{x-2}{x-1}}$

60. Probability distribution for random variable x is

$x=x$	0	1	2	3
$p(x)$	$1/4$	$1/8$	$1/2$	$1/8$

then $V(2x+3)$ = _____

(A) 6 (B) 36
(C) 4 (D) 8

61. Solution of the LP program "Maximize $Z=200x+500y$ subject to $x+2y \geq 10,\ 3x+4y \leq 24, x \geq 0,\ y \geq 0$ is _____

(A) 2000 (B) 2300
(C) 2600 (D) 2500

Section - D : 4 Marks Each

62. If $\begin{bmatrix} 1 & 1 & 1 \\ 2 & -1 & -1 \\ 1 & -1 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 3 \\ 9 \end{bmatrix}$, then $(x, y, z) =$ _____

(A) (2, 3, 4) (B) (5, 3, 6)
(C) (2, -3, 4) (D) (1, -3, 4)

63. $y = \cos^{-1}\left(\frac{3x-4\sqrt{1-x^2}}{5}\right)$, then $\frac{dy}{dx} =$ _____

(A) $\frac{-1}{\sqrt{1-x^2}}$ (B) $\frac{2}{\sqrt{1-x^2}}$

(C) $\frac{-5}{3\sqrt{1-x^2}}$ (D) $\frac{3}{5\sqrt{1-x^2}}$

64. $\int \frac{dx}{(2\sin x+3\cos x)^2} =$ _____ $+ C$

(A) $-\frac{\cos x}{2\sin x+3\cos x}$ (B) $\frac{\cos x}{2\sin x+3\cos x}$

(C) $-\frac{\cos x}{2(2\sin x+3\cos x)}$ (D) $\frac{\cos x}{2(2\sin x+3\cos x)}$

• • •