Question Papers

ExamCode: MATHS_SI_102014

1.

Which of the following is NOT true?	
A.	Z is closed in R^1
B.	Q is closed in R^1
C.	Set of irrationals is not closed in R^1
D.	$\bigcup_{n=1}^{\infty} A_n$ is not closed in R^1, where $A_n = \left[\frac{1}{n}, 1\right]$

2. **In R', the set of all real numbers with usual metric, which of the following is NOT correct.**

1) Set of all integers is NOT open in R'

2) Set of all rationals is NOT open in R'

3) Set of all irrationals is NOT open in R'

4) Complement of every one point set in Set of all rationals is NOT open in R' is NOT open

3.

Limit of the function $f(x) = \sin\frac{1}{x}$ as $x \to 0$ is :	
A.	1
B.	0
C.	-1
D.	None of these

4. **If every cachysequence of points in M is convergent in M, then M is:**

1) Complete

2) Totally bounded

3) Connected

4) Disconnected

5.

Choose the correct statement from the following:	
A.	$\left\{\frac{1}{n}\right\}_{n=1}^{\infty}$ is unbounded
B.	$\left\{-n^2\right\}_{n=1}^{\infty}$ is bounded below
C.	$\left\{(-1)^n.n\right\}_{n=1}^{\infty}$ is bounded above
D.	$\left\{(-1)^{n-1}\right\}_{n=1}^{\infty}$ is bounded but not convergent

6.

When does the series $\sum_{n=1}^{\infty} \frac{x^{n-1}}{1+x^n}$ converges?	
A.	Converges when $x>1$
B.	Converges when $0<x<1$
C.	Converges when $x=1$
D.	None of these

7. **In any metric space, the empty set is:**
1) An open set
2) A closed set
3) Both open and closed
4) Neither open nor closed

8. **Which of the following statements is correct?**
1) Every cauchy sequence of real numbers is bounded
2) Every cauchy sequence of real numbers is convergent
3) Every convergent sequence is a cauchy sequence
4) All of these

9.

Limit of the sequence $\left\{\log\frac{1}{n}\right\}_{n=1}^{\infty}$ is:	
A.	$+\infty$
B.	$-\infty$
C.	1
D.	0

10. **Bolzano-Weierstrass theorem states-**
1) Every convergent sequence is bounded
2) An increasing sequence which is bounded above is convergent
3) Every bounded sequence has a convergent subsequence
4) Limit of a convergent real sequence is always unique

11.

Find the limit superior and limit inferior of the sequence $\{a_n\} = \sin\frac{n\pi}{3}$.	
A.	+1, -1
B.	$\frac{+1}{2}, \frac{-1}{2}$
C.	$\frac{+\sqrt{3}}{2}, \frac{-\sqrt{3}}{2}$
D.	0, 0

12.

If $\phi = \lvert\vec{r}\rvert = r$ then $\nabla\phi$ is:	
A.	$\vec{r}$
B.	$\frac{\vec{r}}{r}$
C.	$\frac{1}{2}\vec{r}$
D.	$\frac{1}{2}\frac{\vec{r}}{r}$

13.

If If $\vec{r}.d\vec{r} = 0$ then $\lvert\vec{r}\rvert =$	
A.	Zero
B.	A constant
C.	One
D.	None of these

14.

Resultant of two like parallel forces 24 gram weight and 9 gram weight acting at A and B respectively.	
A.	$\frac{33}{2}$ gram weight
B.	33 gram weight
C.	11 gram weight
D.	46 gram weight

15.

$\text{Grad}(\vec{r}.\vec{r}) =$	
A.	$\vec{r}$
B.	$r.\vec{r}$
C.	$2\vec{r}$
D.	$\frac{\vec{r}}{2}$

16. If three forces acting at a point are in equilibrium then they must be-

1) Mutually perpendicular
2) Parallel
3) Equally inclined to each other
4) Coplanar

17.

The algebraic sum of deviations from mean is:	
A.	$\bar{x}/2$
B.	Zero
C.	$n.\bar{x}$
D.	1

18.

The value of $\int_c \bar{F}.d\bar{r}$ $\bar{F} = (x^2 - y^2)\hat{i} + 2xy\hat{j}$ and C is the line segment on x-axis from x=0 to x=a is:	
A.	$a^3/3$
B.	a^3
C.	$\frac{2a^3}{3}$
D.	$2a^3$

19. In any discrete series the relationship between M.D. about mean and S.D is :

1) M.D = S.D
2) M.D $\geq$ S.D
3) M.D < S.D
4) M.D $\leq$ S.D

20. If the resultant of two forces acting at a point with magnitudes 7 and 8 is a force with magnitude 13, the angle between the two forces is:

1) 30°
2) 45°
3) 60°
4) 90°

21. **Forces 3, 2, 4, 5 kg weight act along the sides AB, BC, CD, DA of a unit square respectively, then the equation of the line of action of the resultant is:**

1) $3x+y+6=0$
2) $3x-y+6=0$
3) $3x+y-6=0$
4) $3x-y-6=0$

22.

A body of weight 4 kg rests in limiting equilibrium on a rough plane whose slope is 30°. Then the coefficient of friction is:	
A.	$\sqrt{3}$
B.	$\frac{1}{\sqrt{3}}$
C.	$\frac{\sqrt{3}}{2}$
D.	$\frac{1}{2}$

23. **________ is a technique for determining an optimum schedule of interdependent activities in view of available resources.**

1) Transportation problem
2) Assignment problem
3) Linear programming
4) PERT and CPM

24.

Three forces $\overline{P}, \overline{Q}$ and $\overline{R}$ act along the sides BC, CA and AB of a triangle ABC taken in order, and the resultant passes through the incentre, then-	
A.	$P + Q + R = 0$
B.	$P=Q=R$
C.	$P \cos A + Q \cos B + R \cos C = 0$
D.	$P \sec A + Q \sec B + R \sec C = 0$

25.

ABCD is a square of side a. Forces 5P, 4P, 3P, 6P, $2\sqrt{2}$P act along AB, BC, CD, DA, BD respectively. Then-	
A.	The system reduces to a single force
B.	The system is in equilibrium
C.	The system is a couple of moment 9ap
D.	The system is a couple of moment -9ap

26.

If the vector $\bar{f} = 3xi + (x+y)j - az\bar{k}$ is solenoidal then the value of a is:	
A.	1
B.	2
C.	3
D.	4

27.

If S is the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$, the value of $\iint_S (\nabla \times \overline{F}).\hat{n}\,ds$ where $\overline{F} = y\hat{i} + z\hat{j} + x\hat{k}$ is:	
A.	π
B.	$-\pi$
C.	2π
D.	-2π

28.

For a closed curve C, $\int_c \bar{r}.d\bar{r}$ is:	
A.	3
B.	0
C.	1
D.	$2\pi r$

29.

If V is the volume enclosed by the closed surface S, then $\iint_S \bar{r}.\hat{n}\,ds$ is:	
A.	V
B.	$\frac{V}{3}$
C.	3V
D.	0

30.

If $\overline{F} = 4xz\hat{i} - y^2\hat{j} + yz\hat{k}$ and S is the surface bounded by x=0, x=1, y=0, y=1 then the value of $\iint_s \overline{F}.\hat{n}\,ds$ is:	
A.	2
B.	-1
C.	$\frac{1}{2}$
D.	0

31. **When the data is qualitative, which of the following measure of central tendency is used?**

1) Mean
2) Median
3) Mode
4) Geometric and Harmonic mean

32. **When the frequency distribution of a set of data has open end classes at the both ends, the appropriate measure of dispersion is:**

1) Range
2) Standard deviation
3) Mean deviation
4) Quartile deviation

33.

Angle between two suggestion lines are given by $\tan\theta$:	
A.	$\frac{1 \sim r^2}{r} \frac{\sigma_x \sigma_y}{\sigma_{x^2} - \sigma_{y^2}}$
B.	$\frac{r^2 \sim 1}{r} \frac{\sigma_x \sigma_y}{\sigma_{x^2} + \sigma_{y^2}}$
C.	$\frac{1 \sim r^2}{r} \frac{\sigma_x \sigma_y}{\sigma_{x^2} + \sigma_{y^2}}$
D.	$\frac{1 + r^2}{r} \frac{\sigma_x \sigma_y}{\sigma_{x^2} - \sigma_{y^2}}$

34.

Mean deviation about mean of a normal distribution is:	
A.	$\sigma\sqrt{\frac{2}{\pi}}$
B.	$\sigma\sqrt{\frac{\pi}{2}}$
C.	$\frac{1}{\sigma}\sqrt{\frac{2}{\pi}}$
D.	$\frac{1}{\sigma}\sqrt{\frac{\pi}{2}}$

35.

If $\overline{A}$ denotes the complement of a set A and if A_1 and A_2 are independent then $P(\overline{A}_1 \cap \overline{A}_2) =$	
A.	$[1 - P(A_1)][1 - P(A_2)]$
B.	$P(\overline{A}_1).P(A_2)$
C.	$P(A_1).P(\overline{A}_2)$
D.	$1 - P(\overline{A_1 \cup A_2})$

36. **Mean deviation is least when taken from-**

1) Mean
2) Mode
3) Median
4) Any constant k

37.

If $A \cap B = \phi$ then:	
A.	$P(A) \geq P(\overline{B})$
B.	$P(A) \leq P(\overline{B})$
C.	$P(A) = P(\overline{B})$
D.	$P(\overline{A}) = P(\overline{B})$

38. **When does a binomial distribution B(n,p) becomes bimodal?**

1) (n+1)p is an integer
2) (n+1)p is not an integer
3) (n+1)q is an integer
4) (n+1)q is not an integer

39. **Which of the following statement is wrong about Poisson distribution with parameter λ?**

1) First three order central moments are λ
2) Poisson distribution can be derived from binomial distribution under certain assumptions
3) Poisson distribution is sometimes bimodal
4) Poisson distribution is not skewed always.

40. **Odd order moments of about mean of a normal distribution is:**

1) 0
2) $1.3.5\ldots(2n-1)\sigma^{2n}$
3) $1.3.5\ldots(2n+1)\sigma^{(n+1)}$
4) $1.3.5\ldots(2n+1)\sigma^{n}$

41.

Boole's inequality for two events A_1 and A_2 is:	
A.	$P(A_1) + P(A_2) < P(A_1 \cup A_2)$
B.	$P(A_1 \cap A_2) > P(A_1) + P(A_2)$
C.	$P(A_1 \cap A_2) > P(A_1) + P(A_2) - 1$
D.	$P(A_1 \cap A_2) \geq P(A_1) + P(A_2) - 1$

42.

Karl Pearson coefficient of correlation r is given by-	
A.	$\frac{Cov(X,Y)}{(Var X).(Var Y)}$
B.	$\sqrt{\frac{Cov(X,Y)}{Var X. Var Y}}$
C.	$\frac{Cov(X,Y)}{\sqrt{Var X}.\sqrt{Var Y}}$
D.	$\frac{Cov(X,Y)}{\sigma_x^2.\sigma_y^2}$

43.

If we have sampling from finite population of size N, then standard error of sample proportion 'p' SE(p) is given by-	
A.	$SE(p) = \sqrt{\frac{N-n-1}{N-1}.\frac{PQ}{n}}$
B.	$SE(p) = \sqrt{\frac{N-1}{N-n}.\frac{P}{Q}n}$
C.	$SE(p) = \sqrt{\frac{N-n}{N-1}.\frac{PQ}{n}}$
D.	$SE(p) = \sqrt{\frac{N-1}{N-n}.\frac{PQ}{n}}$

44. **For X^2 test of goodness of fit, no theoretical frequency should be-**

1) Greater than 30
2) Less than 5
3) Greater than zero
4) None of these

45.

t-statistic to test the significance of a mean in small samples is:	
A.	$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$
B.	$t = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$
C.	$t = \frac{\bar{x} - \mu}{s/\sqrt{n-1}}$
D.	$t = \frac{\bar{x} - \mu}{\sigma/\sqrt{n-1}}$

46.

Chi-square variate lies in the interval-	
A.	$(-\infty, +\infty)$
B.	$[0, \infty]$
C.	$[0,1]$
D.	$[-1, +1]$

47.

If two dice are thrown what is the probability of getting a doublet?	
A.	$\frac{1}{2}$
B.	$\frac{1}{6}$
C.	$\frac{1}{3}$
D.	$\frac{2}{3}$

48.

If a continuous frequency distribution formula for finding mode is where f_m – frequency of modal class f_1 – frequency of premodal class f_2 – frequency of post modal class.	
A.	$\text{Mode} = l + \frac{f_m - f_1}{2f_m - f_1 - f_2} \times i$
B.	$\text{Mode} = l + \frac{f_m - f_1}{2f_m - (f_1 - f_2)} \times i$
C.	$\text{Mode} = l + \frac{f_m - f_2}{f_m + f_1 - (f_1 - f_2)} \times i$
D.	$\text{Mode} = l - \frac{f_m - f_1}{2f_m + f_1 - f_2} \times i$

49. **Find the Harmonic meaning of 2,4 and 5.**

1) 3.12
2) 3.21
3) 3.16
4) 3.26

50. **Which of the following is false?**

1) The centre of gravity of a uniform triangular lamina lies on its centroid
2) The centre of gravity of three particles of mass placed at its vertices of a triangle lies on its centroid
3) The C.G of three particles of masses placed at the mid points of the sides of the triangle lies in its centroid
4) The C.G of a uniform wire bent in the form of a triangle lies in its centroid

51. **A pair of perpendicular straight lines is drawn through the origin and forming with the line 2x+3y=6 an isosceles triangle right angled at the origin. The equation of the pair of straight lines is:**

1) $5y^2+20xy-5x^2=0$
2) $5y^2+24xy+5x^2=0$
3) $5y^2-24xy-5x^2=0$
4) $5y^2+24xy-5x^2=0$

52. **The condition that the core $ax^2+by^2+cz^2+2fyz+2gzx+2hxy=0$ has three mutually perpendicular generators is:**

1) a-b-c=0
2) a-b+c=0
3) a+b+c=0
4) a+2b+3c=0

53. **The number of circles of a co-axial system which touch a given straight line in their plane is:**

1) 0
2) 1
3) 2
4) 0 or 1 or 2

54. **The value of K if(1,2), (k,-1) are conjugate points with respect to the ellipse $2x^2+3y^2=6$ is:**

1) 2
2) 4
3) 6
4) 8

55.

If P is any point on the ellipse $\frac{x^2}{36}+\frac{y^2}{16}=1$, S and S′ are the foci, then PS+PS′ is equal to-	
A.	4
B.	8
C.	10
D.	12

56. **The point of contact between the line y = x+2 and the parabola $y^2=8x$ has the coordinates-**

1) (2,3)
2) (2,2)
3) (4,2)
4) (2,4)

57. **When w_1 and w^2 be any two subspaces of a finite dimensional vector space V over a field F then which of the following is true.**

1) $\dim w_1 + \dim w_2 = \dim V$
2) $\dim (w_1 + w_2) = \dim V$
3) $\dim (w_1 + w_2) \leq \dim w_1 + \dim w_2$
4) $\dim (w_1 + w_2) \geq \dim w_1 + \dim w_2$

58. **The number of natural numbers n less than 1000 having an odd number of factors is:**

1) 30
2) 31
3) 8
4) 9

59. **How many natural numbers n when n < 50 exist satisfying the condition that (n-1)! Is not a multiple of n?**

1) 15
2) 16
3) 17
4) 18

60. **The CENTROID of the triangle formed by joining the feet of the normal's drawn from any point to the parabola y^2=4ax, lies on-**

1) x-axis
2) Directrix
3) Latus rectum
4) Tangent at vertex

61.

$D^{10}(e^{5x}\sin 5x) = ...$ where D^{10} is the 10th differential coefficient of y with respect to x.	
A.	$(25)^{10}e^{5x}\sin x$
B.	$(50)^5 e^{5x}\sin\left(5x+\frac{5\pi}{2}\right)$
C.	$e^{5x}\sin\left(5x+\frac{5\pi}{2}\right)$
D.	$e^{5x}\cos\left(5x+\frac{5\pi}{2}\right)$

62. **The nth differential coefficient of e^{5x+3} with respect to x is:**

1) $5^n e^{5x}$
2) $3^n e^{5x+3}$
3) $3^n e^{5x}$
4) $5^n e^{5x+3}$

63. **If $y=\sin(m\sin^{-1}x)$ then $(1-x^2)y_2+m^2y=$**

1) y_1
2) xy
3) xy_1
4) x^2y

64.

$\int \frac{dx}{3-2x-x^2} = \ldots$	
A.	$\frac{1}{4}\log\left(\frac{3+x}{1-x}\right)$
B.	$\frac{1}{3}\log\left(\frac{3+x}{1-x}\right)$
C.	$\frac{1}{2}\log\left(\frac{3+x}{1-x}\right)$
D.	$\log\left(\frac{1-x}{3+x}\right)$

65.

If $x<1$ then the coefficient of x^n in the expansion of $\frac{e^x}{1-x}$ is :	
A.	$1-\frac{1}{\underline{\lvert 1}}+\frac{1}{\underline{\lvert 2}}-\frac{1}{\underline{\lvert 3}}+\ldots\ldots+\ldots\infty$
B.	$\sum_{r=0}^{\infty}\frac{1}{2r!}$
C.	$\sum_{r=2}^{\infty}\frac{1}{\underline{\lvert r}}$
D.	$1+\frac{1}{\underline{\lvert 1}}+\frac{1}{\underline{\lvert 2}}+\frac{1}{\underline{\lvert 3}}+\ldots\ldots+\frac{1}{\underline{\lvert n-1}}+\frac{1}{\underline{\lvert n}}$

66.

The expansion of the logarithmic series for $\log_e 2$ is:	
A.	$\frac{1}{1.2}+\frac{1}{3.4}+\frac{1}{5.6}+\ldots$
B.	$1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\ldots$
C.	$\frac{1}{1.2}-\frac{1}{3.4}+\frac{1}{5.6}-\frac{1}{7.8}+\ldots$
D.	$1+\frac{1}{2!}+\frac{1}{3!}+\frac{1}{4!}+\frac{1}{5!}+\ldots$

67. $\log_3 e - \log_9 e + \log_{27} e - \log_{81} e + \ldots$

1) $\log_e 3$
2) $\log_3 2$
3) $\log_e 2$
4) $\log_2 3$

68.

$\log 2 - \frac{(\log 2)^2}{\lfloor 2} + \frac{(\log 2)^3}{\lfloor 3} \ldots\ldots \infty$	
A.	log2
B.	$\sqrt{2}$
C.	1/2
D.	$1 - \log 2$

69.

$\lim_{x \to 0} \frac{e^x - e^{-x}}{\log(1+x)} =$	
A.	$\frac{1}{2}$
B.	2
C.	$\frac{1}{6}$
D.	3

70.

The coefficient of x in the expansion of $\log \frac{1}{6+x-x^2}$ is :	
A.	log 2
B.	$\frac{1}{2}$
C.	$\frac{1}{6}$
D.	$-\frac{1}{6}$

71.

$\lim_{h \to \infty} \left(1 + \frac{a}{h}\right)^{bh} =$	
A.	ab
B.	e^{ab}
C.	e^{a}
D.	e^{b}

72.

$\dfrac{\dfrac{1}{\lfloor 2} + \dfrac{1}{\lfloor 4} + \dfrac{1}{\lfloor 6} + \ldots\infty}{\dfrac{1}{\lfloor 1} + \dfrac{1}{\lfloor 3} + \dfrac{1}{\lfloor 5} + \ldots\infty} =$	
A.	$\dfrac{e-1}{e+1}$
B.	$e-1$
C.	$e+1$
D.	e^2+1

73.

The number of zeros at the end of $\lfloor 61$ is :	
A.	58
B.	31
C.	14
D.	12

74. **A iterative procedure for solving LPP is _____.**

1) Graphical method
2) Simplex procedure
3) Two phase
4) MODI alogorithm

75. **Any prime number greater than 3 can be written in the form of-**

1) 6k+1
2) 6k-1
3) (6k+1) or (6k-1)
4) None of these

76.

If $x = 1 + 2 + \dfrac{4}{\lfloor 2} + \dfrac{8}{\lfloor 3} + \dfrac{16}{\lfloor 4} + \ldots..$then $x^{-1} = \ldots.$	
A.	e^{-2}
B.	e^{2}
C.	$e^{1/2}$
D.	$e^{-1/2}$

77.

If P is a prime number then $\lfloor P-1 + 1$ is divisible by p is the statement of-	
A.	Fermat's theorem
B.	Wilson's theorem
C.	Euler's theorem
D.	Remainder theorem

78.

When $-1 < x < 1$, $1 - 3C_1x + 4C_2x^2 - 5C_3x^3 + \ldots + (-1)^r r + 2C_rx^r + \ldots$ represents the expansion of	
A.	$(1-x)^{-1}$
B.	$(1+x)^{-2}$
C.	$(1+x)^{-3}$
D.	$(1-x)^{-2}$

79. **The curvature of the straight line y=ax+b at an arbitrary point (x,y) is:**

1) $(1+a^2)^{3/2}$
2) 0
3) a^3
4) ∞

80.

The volume of a solid generated by the revolution of the catenary $y = \frac{a}{2}\left(e^{\frac{x}{a}} + e^{\frac{-x}{a}}\right)$ about the x-axis between x=0 and x=b is:	
A.	$\frac{\pi a^2}{4}\left(e^{\frac{2b}{a}} + 2 + e^{\frac{-2b}{a}}\right)$
B.	$\frac{\pi a^2}{4}\left(\frac{a}{2}e^{\frac{2b}{a}} + 2 - \frac{a}{2}e^{\frac{-2b}{a}}\right)$
C.	$\frac{\pi a^3}{8}\left(e^{\frac{2b}{a}} - e^{\frac{-2b}{a}}\right) + \frac{\pi a^2 b}{2}$
D.	$\frac{\pi a^2}{4}\left(e^{\frac{b}{a}} + e^{\frac{-b}{a}}\right)$

81.

$\int \frac{x\,dx}{1+x^4}$ is :	
A.	$\frac{1}{2}\tan^{-1}x^2 + c$
B.	$2\ \tan^{-1}x^2 + c$
C.	$\frac{1}{2}\tan^{-1}x + c$
D.	$2\ \tan^{-1}x + c$

82.

$\beta(4,3) + \beta(3,4) =$	
A.	$\beta(4,4)$
B.	$\beta(3,3)$
C.	$\overline{\lvert 12}$
D.	$\overline{\lvert 7}$

83.

If $x = r\cos\theta,\ \ y = r\sin\theta$ than $\frac{\partial(x,y)}{\partial(r,\theta)} = ...$	
A.	x
B.	θ
C.	r
D.	y

84. **If a is an element of a group G with O(a) =n and P is prime to n, then the order of a^p is ____.**

1) n
2) n^p
3) pn
4) p^n

85.

$\int [\sin(\log x) + \cos(\log x)]\,dx =$	
A.	$\sin(\log x)+c$
B.	$\cos(\log x)+c$
C.	$x\sin(\log x)+c$
D.	$x\log x+c$

86.

$\int_0^1\int_0^2\int_0^3 (x+y+z)\,dx\,dy\,dz =$	
A.	1
B.	18
C.	12
D.	$\frac{12}{5}$

87.

$\int_2^3 \frac{\sqrt{x}\,dx}{\sqrt{5-x}+\sqrt{x}} =$	
A.	1
B.	$\frac{2}{3}$
C.	$\frac{1}{2}$
D.	$\frac{3}{4}$

88.

$\int_1^2 e^x\left(\frac{1}{x}-\frac{1}{x^2}\right)dx =$	
A.	$e\left(\frac{e}{2}-1\right)$
B.	$e(e-1)$
C.	0
D.	$e(e^2+1)$

89.

$\int \sqrt{1+\sin(x/2)}\,dx =$	
A.	$\frac{1}{4}\left(\cos\frac{x}{4}-\sin\frac{x}{4}\right)+C$
B.	$4\left(\cos\frac{x}{4}-\sin\frac{x}{4}\right)+C$
C.	$4\left(\sin\frac{x}{4}-\cos\frac{x}{4}\right)+C$
D.	$4\left(\sin\frac{x}{4}+\cos\frac{x}{4}\right)+C$

90.

$\int_0^{\pi} x\sin^2 x\,dx =$	
A.	$\frac{\pi}{4}$
B.	$\frac{\pi}{2}$
C.	$\frac{\pi^2}{4}$
D.	π^2

91.

$D^{10}\left(\frac{1}{2x+3}\right) = ?$ where D^{10} is the 10^{th} differential coefficient y with respect to x.	
A.	$\lfloor\underline{10}(2x+3)^{10}$
B.	$(-1)^{11}(2x+3)^{10}$
C.	$(2x+3)^{11}$
D.	$\frac{\lfloor\underline{10}\ 2^{10}}{(2x+3)^{11}}$

92.

If $\bar{\bar{F}}$ is solenoidal, Curl CurlCurl(Curl $\bar{\bar{F}}$) is:	
A.	0
B.	$\nabla^4 \bar{\bar{F}}$
C.	$\nabla^4 F$
D.	$-\nabla^2 \bar{\bar{F}}$

93.

Which is false?	
A.	$\nabla r^n \times \vec{r} = 0$
B.	$\nabla r^n . \vec{r} = 0$
C.	$\nabla r^n . \vec{r} = nr^n$
D.	$\nabla r^n = nr^{n-2}\vec{r}$

94.

Which is false?	
A.	$\nabla(\log r) = \dfrac{\bar{r}}{r^2}$
B.	$\nabla(\log r) \times \bar{r} = 0$
C.	$\nabla(\log r) . \bar{r} = 1$
D.	$\nabla(\log r) = \dfrac{\bar{r}}{r^3}$

95. **Equation of tangent plane to the surface xyz=4 at the point (1,2,2) is:**

1) 2x+y+z+6=0
2) 2x+y+z-6=0
3) x+2y+z-6=0
4) x+y+2z-6=0

96.

The least upperbound and greatest lower bound, if they exist of the set $\left\{\dfrac{3n-2}{2n+1} : n \in N\right\}$.	
A.	$\frac{3}{2}, \frac{3}{5}$
B.	$\frac{3}{5}, \frac{3}{2}$
C.	$2, \frac{3}{2}$
D.	$\frac{5}{3}, \frac{3}{2}$

97. **Which of the following is false?**

1) Set of all integers is countable
2) Set of all real numbers is uncountable
3) Set of all algebraic numbers is uncountable
4) Set of all transcendental numbers uncountable

98. **A necessary and sufficient condition for a non-empty subset H of a group G to be a subgroup is _____.**

1) $H^{-1} \subset H$
2) $HH^{-1} \subseteq H$
3) $H \subseteq H^{-1}$
4) $H \subseteq HH^{-1}$

99.

If $f(x)=1+\sin x$, $(-\infty < x < +\infty)$ and $g(x)=x^2\ (0 \le x < \infty)$ then $g_o f(x)$ is given by-	
A.	$1+2\sin x+\sin^2 x(0 \le x < +\infty)$
B.	$1+2\sin x+\sin^2 x(-\infty < x < +\infty)$
C.	$1+\sin x^2(-\infty < x < +\infty)$
D.	$1+\sin x^2(0 \le x < +\infty)$

100.

If d is a usual metric on R^2 and if $T:R^2 \to R^2$ is defined as $T(x)=\frac{x}{3}, \forall x \in R^2$ then T is :	
A.	An isometry
B.	A contraction
C.	An oscillation
D.	None of these

101. **If $f:A \to B$ is a function has f^{-1} then f is**

1) Onto
2) Into
3) One-one & Onto
4) None of these

102.

Find sup S and in f s for $s=\left\{\frac{1}{2^m}+\frac{1}{3^n};m,n\in N\right\}$	
A.	1 , 0
B.	$\frac{5}{6}$, 0
C.	0 , 1
D.	0 , $\frac{5}{6}$

103. **The set A=[0,1]U[2,3] is**

1) A Connected set in R'
2) A disconnected set in R'
3) A unbounded set in R'
4) None of these

104. **Which of the following is not true?**

1) Discrete metric space R_d has no proper dense subset
2) Set of rationals is dense in R^1
3) Set of integers is dense in R^1
4) Set of irrationals dense in R^1

105. **In a simpler table of a linear programming problem maximization if all $\Delta j=(Z_j-C_j)\geq 0$ then the solution under test will be**

1) Infeasible
2) Unbounded
3) Optimal
4) Degenerate

106. **To convert $x+2y \leq 11$ into an equality, we need**

1) A slack variable
2) A surplus variable
3) An artificial variable
4) A decision variable

107. **If (a,b) = d, a/c, b/c then**

1) a/d
2) ab/cd
3) ac/bd
4) c/d

108.

Inverse Laplace transform of $\dfrac{1}{s^2-6s+10}$	
A.	$e^{-3t}\cos t$
B.	$e^{3t}\cos t$
C.	$e^{-3t}\sin t$
D.	$e^{-3t}\sin t$

109.

Particular integral of $x^2\dfrac{d^2y}{dx^2}+y=3x^2$ is	
A.	X
B.	$-x+1$
C.	x^2
D.	$-x^2+1$

110.

Particular integral of $(D^2-4)y=x^2$, where $D\equiv\frac{d}{dx}$, is	
A.	$-\frac{1}{8}(2x^2+1)$
B.	$\frac{1}{8}(2x^2+1)$
C.	$\frac{1}{4}(x^2+1)$
D.	$-\frac{1}{4}(2x^2+1)$

111.

Particular integral of $(D^2-3D+2)y=$ $Cosh\ x$, when $D\equiv\frac{d}{dx}$ is	
A.	$\frac{x}{2}\ e^x-\frac{e^{-x}}{12}$
B.	$-\frac{x}{2}\ e^x+\frac{e^{-x}}{12}$
C.	$\frac{x}{2}e^x-\frac{e^{-x}}{6}$
D.	$-\frac{x}{2}e^x+\frac{e^{-x}}{6}$

112.

Solutions of the differential equation $p^2-7p+12=0$, when $p=\frac{dy}{dx}$ are	
A.	$y+3x+c_1=0$ & $y+4x+c_2=0$
B.	$y-3x-c_1=0$ & $y-4x-c_2=0$
C.	$3y-x+c_1=0$ & $4y-x-c_2=0$
D.	$x-3y-c_1=0$ & $x-4y-c_2=0$

113. In an lpp, the number of extreme points of the feasible region is _________

1) Infinite
2) Finite
3) Countable
4) Zero

114.

The value of the integral $\int_0^\infty e^{-2t} \sin 3t \, dt$	
A.	$\frac{1}{13}$
B.	$\frac{3}{13}$
C.	$\frac{2}{13}$
D.	$\frac{6}{13}$

115. Which of the following problems has no relevance with operations research.

1) Inventory control
2) Game theory
3) Measure theory
4) PERT and CPM

116.

$L^{-1}\left(\frac{2}{(s-1)^3}\right)$ is	
A.	$e^{-t}\, t^2$
B.	$e^{t}\, t^2$
C.	$e^{-2t}\, t$
D.	$e^{2t}\, t$

117.

The value of $L^{-1}\left(\frac{s}{(s+1)^2+s}\right)$ is	
A.	$e^{t}[\cos t + \sin t]$
B.	$e^{-t}[\cos t - \sin t]$
C.	$e^{-t} \cos t + \sin t$
D.	$\cos t - e^{-t} \sin t$

118.

The solution of the equation $x^2 \frac{d^2y}{dx^2} - 3x\frac{dy}{dn} + 4y = 0$ is	
A.	$y = (A + Bx)\, e^{2x}$
B.	$y = (A + B \log x) e^{2x}$
C.	$y = (A + B \log x) x^2$
D.	$y = (A + Bx) \log x$

119.

Eliminating the arbitrary fueling of $Z = f\left(\frac{y}{x}\right)$ the partial Differential equation is	
A.	$px = -qy$
B.	$pq = -xy$
C.	$p - q = x - y$
D.	$x + y = p + q$

120.

The general solution to the differential equation $px + qy = p + q$	
A.	$e^{z} = \frac{x-1}{y-1}$
B.	$e^{z} = \frac{ax-1}{ay-1}$
C.	$e^{\frac{z}{z}} = \frac{x+1}{y+1}$
D.	$e^{\frac{z}{z}} = \frac{x-1}{y-1}$

121.

The complimentary function of $(D^3 - D)y = 0$ $D = \frac{d}{dx}$	
A.	$y = A + Be^{x} + Ce^{-x}$
B.	$y = Ax^2 + Bx + C$
C.	$y = Ae^{2x} + Be^{x} + C$
D.	$y = Ae^{x} + Be^{-x}$

122.

The particular integral of $(3D^2-4D+5)y=3e^{2x}$	
A.	$\frac{2}{3}e^{2x}$
B.	$-\frac{1}{3}e^{2x}$
C.	e^{2x}
D.	$\frac{1}{3}e^{2x}$

123.

The degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^{\frac{5}{3}}=\frac{d^2y}{dx^2}$	
A.	5
B.	3
C.	2
D.	1

124.

The complimentary function of the differential equation $(D^2-3D+2)y=f(x)$	
A.	$Ae^{x}+Be^{2x}$
B.	$Ae^{-x}+Be^{-2x}$
C.	$Ae^{2x}+Be^{3x}$
D.	$Ae^{-3x}+Be^{2x}$

125. The general solusion of P=log (px-y) is

1) $y = cx+e^{y}$
2) $y = cx-e^{c}$
3) (y-px) = log c
4) log (cx+y) = c

126.

The particular integral of $(D^2+2D+5)y=xe^x$	
A.	$e^x\left(x-\frac{1}{2}\right)$
B.	$\frac{e^x}{8}\left(x+\frac{1}{2}\right)$
C.	$e^x\left(x+\frac{1}{2}\right)$
D.	$\frac{e^x}{8}\left(x-\frac{1}{2}\right)$

127.

Given $\frac{dy}{dx} = ye^x$ when x = 0 y = e the value of y when x = 1	
A.	e
B.	e^e
C.	$e^{1/e}$
D.	$\frac{1}{e}$

128.

The general solution of the differential equaling $\frac{dy}{dx} = f(x)$ is	
A.	$y = \int f(x)dx + c$
B.	$\int f(x)\, dx = c$
C.	$y = af(x) + c$
D.	None of these

129.

If $x = A\cos(wt + \alpha)$ the differential equation satisfying the relation is	
A.	$\frac{d^2x}{dt^2} = \alpha + x^2$
B.	$\frac{d^2x}{dt^2} = -\omega^2 x$
C.	$\frac{d^2x}{dt^2} = -\alpha^2 x$
D.	$\frac{d^2x}{dt^2} = 1 + \omega^2$

130. In linear programming problem, the function to be optimized is called-

1) Recursive function
2) Goal function
3) Aim function
4) Objective Function

131. In lpp, the set of all points lying in the common region satisfied by all the constraits simultaneously is called

1) The feasible region
2) The possible region
3) Indefinite region
4) The solution region

132. Which is true? In a group,

1) Union of two sub groups is a sub group
2) Intersection of the sub groups is not a sub group
3) Intersection of two normal sub groups is normal
4) Intersection of two normal sub groups is not normal

133. The function given by f : R → R, f(x) = cos x for all x ∈ R is

1) One - to - one
2) On-to
3) Both one-to-one and onto
4) neithes one-to-one nor on-to

134. Consider the ring, Z_4={ [0], [1], [2], [3] }, the residue classes of integers modulo 4 under multiplication then

1) Z_4 has no zero divisors
2) Z_4 has [2] as zero divisor
3) Z_4 has [1] as zero divisor
4) Z_4 has [3] as zero divisor

135. A base solution to the system is called degenerate if ___________,

1) One base variable vanish
2) One or more basic variable vanish
3) One or more basic variable are negative
4) One basic variable is positive

136.

The Eigen vectors of the matrix $\begin{pmatrix} 3 & 2 \\ 1 & 4 \end{pmatrix}$ are	
A.	$\begin{pmatrix} 3 \\ 1 \end{pmatrix}$ *and* $\begin{pmatrix} 2 \\ 4 \end{pmatrix}$
B.	$\begin{pmatrix} 3 \\ 2 \end{pmatrix}$ *and* $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$
C.	$\begin{pmatrix} -2 \\ 1 \end{pmatrix}$ *and* $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$
D.	$\begin{pmatrix} 2 \\ -1 \end{pmatrix}$ *and* $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$

137. If F is a field, which is true.

1) Its only ideals are {0} and F itself
2) It has ideals other than {0} and F
3) It is not a commutatine ring in the unit element
4) Its only ideal is {0}

138.

The multiplicative group $G=\{\rho,\ \rho^2, \rho^3, \rho^4, \rho^5, \rho^6=1\}$ of sixth roots of unity is	
A.	A cyclic group with generator ρ only
B.	A cyclic group with generator ρ and ρ^5
C.	A cyclic group with generator ρ^5 only
D.	Not a cyclic group

139. Which one of the following statement is false ?

1) The order of every sub group of a group divides the order of group
2) The order of every sub group of a finite group divides the order of group
3) Every group of prime order is cyclic
4) The sub group of a cyclic group is cyclic

140. Which is true?

1) All groups of orders up to 5 abelian
2) A group of order 2 is not abelian
3) A group of order 3 is not abelian
4) A group of order 4 is not abelian

141. E={ (0,0), (1,1), (2,2), (3,3), (0,2), (1,3), (2,0), (3,1) } in {0,1,2,3}

1) Is an equivalence relation
2) Only reflexive property is true
3) Only symmetry is true
4) Only transitive property is true

142.

For the matrix A= $\begin{pmatrix} 2 & 3 \\ 5 & 1 \end{pmatrix}$ which is true ?	
A.	$A^2-3A-13I=\begin{pmatrix} 2 & 3 \\ 5 & 1 \end{pmatrix}$
B.	$A^2-3A-13I=\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$
C.	$A^2-3A-13I=\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
D.	$A^2-3A-13I=\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

143.

The characteristic equation of the matrix A is $\lambda^3+\lambda^2-12\lambda+18=0$ then the inverse of A is given by	
A.	The inverse does not exist
B.	$A^{-1}=\frac{1}{18}\left[A^2+A-12I\right]$
C.	$A^{-1}=-\frac{1}{18}\left[A^2+A-12I\right]$
D.	$A^{-1}=\frac{1}{12}\left[A^2+A+18I\right]$

144.

The matrix $\begin{pmatrix} a & 4 \\ 1 & b \end{pmatrix}$ has 3 and -2 as its Eigen values. Then the constants a and b are	
A.	$a=3\,;\,b=-2$
B.	$a=-3;\,b=4$
C.	$a=-1,\,b=2$
D.	$a=1,\ b=2$

145. **The System of equations 2x+3y-3z = 0 3x-3y+z = 0 3x-2y-3z = 0**

1) Has infinite number of non trivial solutions
2) Has a finite number of non trivial solutions
3) Has a unique trivial solution, x=0, y=0, z=0
4) Has no solutions

146.

In the quotient group G/N the identity element is	
A.	$\frac{e}{N}$
B.	$\frac{N}{e}$
C.	N
D.	eN^{-1}

147.

It ϕ is a homomorphism of G into G' with kernel K, then	
A.	$\phi(a^{-1}) = [\phi(a)]^{-1}$ for all $a \in G$
B.	$[\phi(a)]^n = \phi(a^n)$
C.	$g\,k\,g^{-1} \in K$ for all $k \in K$
D.	All the above are true

148.

A homomorphism f: (Z, +)→{1,-1} is given by f(n)= $\begin{cases} 1 & \text{if } n \text{ is even} \\ -1 & \text{if } n \text{ is odd} \end{cases}$ then the kernel of f is	
A.	Ker f = {0}
B.	Ker f = 2Z
C.	Ker f = {1}
D.	Ker f = Z

149. **If R is a ring such that a^2=a for all a ∈ R, then which is true-**

1) a+a = 0
2) a+b = 0 ==> a = b
3) ab = ba
4) All the above are true

150.

A base feasible solution X_B to the LPP Maximize Z=CX subject to Ax=b ω x ≥ 0 is called an optimum basic feasible solution if	
A.	$Z_0 = C_B X_B \geq Z^A$
B.	$Z_0 - C_B X_B \geq 0$
C.	$Z_0 - C_B \geq 0$
D.	$Z_0 - X_B \geq 0$

151. **A ball of mass 1kg moving with velociity 7m/sec overtakes and collides with a ball of mass 2kg moving with velocity 1m/sec in the same direction. If e=3/4 the velocity of the lighter ball after impact**

1) 0m/sec
2) 7m/sec
3) 1m/sec
4) 2m/sec

152. **Polar equation of circle passing thro pole with centre on initial line is**

1) r=a
2) $r=2a\cos(\theta-\alpha)$
3) $r=2a\cos\theta$
4) $r=2a\cos(\theta-\alpha)+c$

153.

Which pair of straight line are perpendicular?	
A.	$\cos\theta+\sin\theta=\frac{\sqrt{2}}{r}$, $\cos\theta-\sin\theta=\frac{\sqrt{2}}{r}$
B.	$2\cos\theta+\sin\theta=\frac{2}{r}$, $\cos\theta-\sin\theta=\frac{2}{r}$
C.	$\cos\theta-2\sin\theta=\frac{1}{r}$, $2\cos\theta-\sin\theta=\frac{3}{r}$
D.	$3\cos\theta+2\sin\theta=\frac{5}{r}$, $\cos\theta-2\sin\theta=\frac{1}{r}$

154.

The pedal equation of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ with the pole at the centre, is	
A.	$r^2=a^2-3p^2$
B.	$p=r$
C.	$r^2=2ap$
D.	$r^2=a^2+b^2-\frac{a^2b^2}{p^2}$

155. **The role of artificial variables in LPP is get________.**

1) Basic solution
2) Degenerate solution
3) Starting feasible solution
4) Infeasible solution

156. **A mass 5kgms is placed on the floor of a lift which ascends with constant acceleration. The reaction between the mass and lift is 10kgms. The acceleration of lift is**

1) 5m/sec^2
2) 10m/sec^2
3) 9.8m/sec^2
4) None of these

157.

A ball is dropped from a height "h" on a horizontal plane and the Coefficient of restitution for the impact is "e" the velocity with which the ball rebounds from the floor is	
A.	eh
B.	ehg
C.	$e\sqrt{2gh}$
D.	$e\sqrt{gh}$

158.

The equation of a straight line joining the points (3,30°)&(4, 90°) is	
A.	$\frac{\sqrt{3}}{r} = \cos\theta + \sqrt{3}\sin\theta$
B.	$\frac{12}{r} = 5\cos\theta + 3\sin\theta$
C.	$\frac{12\sqrt{3}}{r} = 5\cos\theta + 3\sqrt{3}\sin\theta$
D.	$\frac{12\sqrt{3}}{r} = 3\cos\theta + 5\sqrt{3}\sin\theta$

159.

The point of intersection of two lines $r\cos\left(\theta-\frac{\pi}{3}\right)-2=0$ and $r\cos\left(\theta-\frac{5\pi}{6}\right)-2=0$ is-	
A.	$\left(2\sqrt{2}, \frac{7\pi}{12}\right)$
B.	$\left(2, \frac{5\pi}{12}\right)$
C.	$\left(1, \frac{7\pi}{12}\right)$
D.	$\left(1, \frac{5\pi}{12}\right)$

160. In lpp, constraints with inequalities "≤", the vaniables to be used are___________.

1) Slack
2) Surplus
3) Arfificial
4) Basic

161. The envelope of family of circles describes on the double ordinates of the parabola $y^2=4ax$ as diameter, is

1) $y^2=8a(x-a)$
2) $y^2=8a(x+a)$
3) $y^2=4a(x-a)$
4) $y^2=4a(x+a)$

162. **The number of oblique asymptotes of the curve $y^2(x^2-a^2) = x^2(x^2-4a^2)$ is**

1) 4
2) 3
3) 2
4) None of these

163.

Which point lies on the straight line $\sqrt{2}\cos\theta + 2\sqrt{2}\sin\theta = \frac{3}{r}$	
A.	$\left(\frac{1}{2}, \frac{\pi}{4}\right)$
B.	$\left(2, \frac{\pi}{4}\right)$
C.	$\left(1, \frac{\pi}{4}\right)$
D.	$\left(1, \frac{\pi}{2}\right)$

164. **In any conic semi latus rectum is,**

1) Arithmetic mean between the segments of any focal chord
2) Harmonic mean between the segments of any focal chord
3) Geometric mean between the segments of any focal chord
4) None of the above

165.

The angle between the radius vector and the tangent tor the curve $r^2 = a^2\cos 2\theta$ at $\theta = \frac{\pi}{6}$ is.....	
A.	$\frac{5\pi}{6}$
B.	$\frac{4\pi}{3}$
C.	$\frac{7\pi}{6}$
D.	$\frac{\pi}{6}$

166. **Curvature of a straight line is......**

1) 1
2) 2
3) 0
4) 3

167. **The evolute of the parabola y2 = 4ax is________.**

1) $4ay^2 = 27(x-2a)^3$
2) $27ay^3=4(x-2a)^2$
3) $27ay^2=4(x-2a)^3$
4) $27ay = 8(x-2a)^3$

168. **what is the radins of currature of the circle $X^2+y^2=100$ at (10,0) ?**

1) 100
2) 1/10
3) 1
4) 10

169.

The equation of asymptotes of the conic $\frac{l}{r} = 1 + \sqrt{2}\cos\theta$ is	
A.	$\frac{l}{r} = \cos\theta \pm \sin\theta$
B.	$\frac{3l}{2} = \cos\theta \pm \sin\theta$
C.	$\sqrt{2}\frac{l}{r} = \cos\theta \pm \sin\theta$
D.	$\frac{5l}{2} = \cos\theta \pm \sin\theta$

170.

The magnets of inertia of a circular dice radius 'a' about its diameters	
A.	$\frac{Ma^2}{2}$
B.	$\frac{M^2a}{2}$
C.	$\left(\frac{Ma}{2}\right)^2$
D.	$\frac{Ma^2}{4}$

171.

The equation of normal at $\frac{\pi}{4}$ on the conic $\frac{l}{r} = 1 + \frac{1}{\sqrt{2}}\cos\theta$	
A.	$\frac{\sqrt{2}l}{3r} = 2\sin\theta - \cos\theta$
B.	$\frac{l\sqrt{2}}{r} = 2\cos\theta + \sin\theta$
C.	$\frac{l}{r} = \cos\theta + \sin\theta$
D.	$\frac{l}{r} = \cos\theta - \sin\theta$

172.

A particle executes S H M making 100 complete oscillations per minute and maximum speed is 15ft/sec. The amplitude of the particle is	
A.	$\frac{9}{2\pi}$ ft
B.	$\frac{2\pi}{9}$ ft
C.	$\frac{\pi}{9}$ ft
D.	$\frac{9}{\pi}$ ft

173.

The pedal equation of $x^{2/3}+y^{2/3}=a^{2/3}$	
A.	$r=a$
B.	$r^2=a^2-3p^2$
C.	$p^2=ar$
D.	$r^2=a^2+b^2-\frac{a^2b^2}{p^2}$

174. **The envelope of the family of lines xcosα+ysimα=p (α, parameter; p,constant) is**

1) $x^2-y^2=p^2$
2) $xy=p^2$
3) $x^2+y^2=p^2$
4) $x+y=p$

175. **Two perfectly elastic smooth sphere of masses m and 3m moving with equal momentum in the same straight line and in the same direction, the velocity of the smaller sphere after it strikes the other is**

1) 3
2) 1.5
3) 0
4) 1

176.

The number of asymptotes of the curve $\frac{a^2}{x^2}-\frac{b^2}{y^2}=1$	
A.	4
B.	3
C.	2
D.	1

177.

The moment of inertia of a solid sphere of radius "a" about its diameter with M as the mass of sphere is	
A.	$\frac{2}{5}Ma^2$
B.	$\frac{5}{2}Ma^2$
C.	$\frac{3}{5}Ma$
D.	$\frac{1}{5}Ma^2$

178.

A particle is dropped under gravity with initial velocity "u' the distance travelled in nth second is	
A.	$u+\frac{1}{2}g(2n+1)$
B.	$u-\frac{1}{2}g(2n-1)$
C.	$u+\frac{1}{2}g(2n-1)$
D.	$u-\frac{1}{2}g(2n+1)$

179.

Two balls are projected from same point in direction inclined at 45° and 30° to horizontal respectively. If their height reached is same the ratio of theirvelocities of projection is	
A.	1:2
B.	2:1
C.	$\sqrt{2}:1$
D.	$1:\sqrt{2}$

180. Angular velocity of a point moving on a plane curve is a constant. The transverse acceleration is proportional to

1) Radius
2) Radial acceleration
3) Radial velocity
4) None of these

181.

A particle executing simple harmonic motion with maximum velocity 1m/sec with period $\frac{1}{5}$ of a second.The amplitude of simple Harmonic motion is:	
A.	10π
B.	5π
C.	$\frac{1}{10\pi}$
D.	$\frac{1}{5\pi}$

182.

Which is not correct?	
A.	$4x^2 - 5xy + y^2 + 2x + y - 2 = 0$, represents a pair of straight lines
B.	$x^2 + 6xy + 9y^2 + 10x + 30y + 25 = 0$, represents a pair of coincident lines
C.	$6x^2 - 5xy - 6y^2 + 14x + 5y + 4 = 0$, represents a pair of perpendicular lines
D.	The bisectors of the pair of straight lines $ax^2 + 2hxy + by^2 = 0$ are given by $\frac{x^2 - y^2}{b} = \frac{xy}{a^2 - b^2}$

183. The equation of the director circle of the hyperbola $9x^2 - 16y^2 = 144$ is

1) $x^2+y^2 = 7$
2) $x^2 + y^2 = 9$
3) $x^2 + y^2 = 16$
4) $x^2 + y^2 = 25$

184.

If CP and CD are semi-conjugate diameters of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ with usual notation then CP^2+CD^2 is:	
A.	$a^2 + b^2$
B.	$a^2 - b^2$
C.	$2a^2 + b^2$
D.	$a^2 + 2b^2$

185.

$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a circle only if:	
A.	$a = b, h = 0$
B.	$a = b \neq 0, h = 0$
C.	$a = b \neq 0, h = 0, g^2+f^2-c > 0$
D.	$a = b \neq 0, h = 0, g^2+f^2-ac > 0$

186. If three circles are such that each intersects the remaining two, their radical axes

1) Form a triangle
2) Are coincident
3) Are concurrent
4) Are parallel

187.

The equation of cylinder whose generators are parallel to the line $\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ and whose guiding curve is the ellipse $x^2 + 2y^2 = 1,\ z = 0$ is:	
A.	$x^2 + 2y^2 + z^2 + xy + yz + zx - 3 = 0$
B.	$6x^2 + 3y^2 + 6z^2 - xy - 3xz = 0$
C.	$3x^2 + 6y^2 + 3z^2 - 2zx + 8yz - 3 = 0$
D	$6x^2 + 3y^2 + 2z^2 - xy - yz - 3 = 0$

188. **The centre of the circle given by $x^2+y^2+z^2-2y-4z+1 = 0$; $x+2y+2z = 15$**

1) (1, -3, 4)
2) (-1, 3, 4)
3) (1, 3, -4)
4) (1, 3, 4)

189. **If $ax^2+2hxy+by^2+2gx+2fy+c = 0$ represents parallel straight lines then**

1) $hf = bg$
2) $h^2 = bc$
3) $af^2 = bg^2$
4) None of these

190. **The sum of all the integers which are less than 500 and prime to it**

1) 25000
2) 20000
3) 50000
4) 45000

191. **The number of integers which are less than 500 and prime to it**

1) 250
2) 400
3) 450
4) 200

192. **If J_1 is the Jacobian of u(x,y), and v(x,y) and J_2 is the Jacobian of x(u,v), and y(u,v) then $J_1 J_2$ = ?**

1) 0
2) uv
3) 1
4) xy

193.

A is the area of the closed region in the XY plane then the total volume of solid of revolution is given by-	
A.	$\iint_A xy\,dxdy$
B.	$\pi\iint_A xy\,dxdy$
C.	$2\pi\iint_A y\,dxdy$
D.	$4\pi\iint_A dxdy$

194.

The value of $\iint_R (x^2+y^2)\,dxdy$ where R is the region in the positive quadrant for which $x+y\leq 1$=...	
A.	$\frac{1}{3}$
B.	$\frac{1}{4}$
C.	$\frac{1}{6}$
D.	$\frac{1}{12}$

195.

The center of the sphere $(x-x_1)(x-x_2)+(y-y_1)(y-y_2)+(z-z_1)(z-z_2)=0$ is	
A.	(x_1, y_1, z_1)
B	$\left(\frac{x_1-x_2}{2}, \frac{y_1-y_2}{2}, \frac{z_1-z_2}{2}\right)$
C.	$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}, \frac{z_1+z_2}{2}\right)$
D.	None of these

196. **The plane 2x-2y+z+12=0 touches the sphere $x^2+y^2+z^2-2x-4y+2z-3=0$ at the point**

1) (1, -4, -2)
2) (-1, 4, -2)
3) (-1, -4, 2)
4) (1, 4, -2)

197. **Necessary and snfficient condifion for the existence of a fearible solution to the transportation proflam is __________.**

1) $\Sigma ai < \Sigma bi$
2) $\Sigma ai > \Sigma bi$
3) $\Sigma ai = \Sigma bi$
4) $\Sigma ai \neq \Sigma bi$

198. **The equation enveloping cone of the sphere $x^2+y^2+z^2 = 1$ with the point (1,1,1,) as its vertex is**

1) $x^2+y^2+z^2-xy-yz+zx+x+y+z-3=0$
2) $x^2+y^2+z^2-2xy-2yz-2zx+2x+2y+2z-3=0$
3) $x^2+y^2+z^2-2xy+2yz+2zx-2x-2y-2z+3=0$
4) None of these

199. **The radical plane of the spheres $x^2+y^2+z^2+2x+2y+2z+2=0$ & $4x^2+4y^2+4z^2+4x+4y+4z-1=0$ is**

1) 4x+4y+4z+9=0
2) x+y+z+9=0
3) 4x+4y+4z+1=0
4) None of these

200.

If $x \perp y$ (x is orthogonal to y) is an inner product space, for all scalers α, we have-	
A.	$\|x + \alpha y\| = \|x - \alpha y\|$
B.	$\|x + \alpha y\| \leq \|x - \alpha y\|$
C.	$\|x + \alpha y\| \geq \|x - \alpha y\|$
D.	None of these