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PG-EE-2016

SUBJECT : Mathematics Hons. Five Year

D

Sr. No. 10108

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Father's Name _____

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7. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

1. The solution of $x\,dy - y\,dx + x^2 e^x dx = 0$ is :

(1) $\frac{x}{y} + e^x = C$ (2) $x + e^y = C$ (3) $\frac{y}{x} + e^x = C$ (4) $y + e^x = C$

2. The algebraic sum of deviation of 20 observations measured from 30 is 2. The mean observation is :

(1) 28.5 (2) 29.6 (3) 30.5 (4) 30.1

3. The standard deviation of 15 items is 6 and if each item is decreased by 1, then standard deviation will be :

(1) 5 (2) 7 (3) 6 (4) None of these

4. If in a frequency distribution, the mean and median are 21 and 22 respectively, then its mode is approximately :

(1) 24 (2) 42 (3) 22 (4) 20

5. A coin is tossed 4 times. The probability that at least one head turns up is :

(1) $\frac{1}{16}$ (2) $\frac{15}{16}$ (3) $\frac{2}{16}$ (4) None of these

6. One card is drawn randomly from a pack of 52 cards, then the probability that it is a king or spade is :

(1) $\frac{1}{13}$ (2) $\frac{2}{13}$ (3) $\frac{3}{13}$ (4) $\frac{4}{13}$

7. A problem in mathematics is given to three students A, B, C and their respective probability of solving the problem is $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$. Probability that the problem is solved, is :

(1) $\frac{1}{3}$ (2) $\frac{1}{2}$ (3) $\frac{3}{4}$ (4) $\frac{2}{3}$

8. Five coins whose faces are marked 2, 3 are tossed. The chance of obtaining a total of 12 is :

(1) $\frac{1}{32}$ (2) $\frac{1}{16}$ (3) $\frac{3}{16}$ (4) $\frac{5}{16}$

9. A card is drawn from a pack of cards. The probability that the card will be a queen or a heart, is :

(1) $\frac{2}{13}$ (2) $\frac{4}{13}$ (3) $\frac{3}{13}$ (4) None of these

10. If a dice is thrown twice, the probability of occurrence of 4 at least once, is :

(1) $\frac{11}{36}$ (2) $\frac{7}{12}$ (3) $\frac{35}{36}$ (4) None of these

11. $\int x^x(1+\log x)\,dx$ is equal to :

(1) $x^{2x}+C$ (2) x^x+C (3) $x^x \log x$ (4) None of these

12. $\int \frac{x}{x^2+4x+5}\,dx$ is equal to :

(1) $\frac{1}{2}\log\left[x^2+4x+5\right]-2\tan^{-1}(x+2)+C$

(2) $\frac{1}{2}\log\left[(x+2)^2-1\right]+2\tan^{-1}(x+2)+C$

(3) $\frac{1}{2}\log\left[x^2+4x+5\right]+C$

(4) None of these

13. $\int \frac{dx}{\sin x \cos x}$ is equal to :

(1) $\log|\sin x|+C$ (2) $\log|\sec x|+C$

(3) $\log|\tan x|+C$ (4) None of these

14. $\int_{-\frac{1}{2}}^{\frac{1}{2}} (\cos x)\left[\log\left(\frac{1-x}{1+x}\right)\right]dx$ is equal to :

(1) 1 (2) $e^{\frac{1}{2}}$ (3) 0 (4) -1

15. $\int_2^3 \frac{dx}{x^2-x}$ is equal to :

(1) $\log\left(\frac{2}{3}\right)$ (2) $\log\left(\frac{1}{4}\right)$ (3) $\log\left(\frac{8}{3}\right)$ (4) $\log\left(\frac{4}{3}\right)$

16. The value of $\int_{-\pi}^{\pi}(1-x^2)\sin x \cos^2 x\,dx$ is :

(1) π (2) 0 (3) 2π (4) None of thes

17. The area bounded by $y = \log x$, x-axis and ordinates $x = 1, x = 2$ is :

(1) $\log\left(\frac{4}{e}\right)$ sq. unit (2) $\log\left(\frac{2}{e}\right)$ sq. unit

(3) $\log 4$ sq. unit (4) None of these

18. Area bounded by the curves $y = x^2$ and $y^2 = x$ is :

(1) $\frac{2}{3}$ sq. unit (2) $\frac{1}{3}$ sq. unit (3) $\frac{1}{2}$ sq. unit (4) None of these

19. Area of region satisfying $x \leq 2, y \leq |x|$ and $x \geq 0$ is :

(1) 4 sq. unit (2) 1 sq. unit (3) 2 sq. unit (4) None of these

20. $\int \frac{dx}{x^2+4x+13}$ is equal to :

(1) $\tan^{-1}\left(\frac{x+2}{3}\right)+C$ (2) $\frac{1}{3}\tan^{-1}\frac{x}{2}+C$

(3) $\tan^{-1}(x-2)+C$ (4) None of these

21. If A is a square matrix, then $(A + A')$ is :

(1) unit matrix (2) symmetric matrix

(3) non-singular matrix (4) skew-symmetric matrix

22. If $A=\begin{bmatrix}\alpha & 0\\ 1 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0\\ 5 & 1\end{bmatrix}$, then value of α for which $A^2 = B$ is :

(1) 1 (2) -1 (3) 4 (4) no real value

23. If $A=\begin{bmatrix}0 & 3\\ 2 & 0\end{bmatrix}$ and $A^{-1} = \lambda(\text{adj } A)$, then λ is equal to :

(1) $-\frac{1}{6}$ (2) $\frac{1}{6}$ (3) $\frac{1}{3}$ (4) $-\frac{1}{3}$

24. If A is a square matrix such that $AA' = I = A'A$, then $|A|$ is equal to :

(1) 0 (2) ± 2 (3) ± 1 (4) None of these

25. If w is a complex cube root of unity, then $\begin{vmatrix}1 & w & -w^2/2\\ 1 & 1 & 1\\ 1 & -1 & 0\end{vmatrix}$ is equal to :

(1) 1 (2) w (3) 0 (4) w^2

26. If $C = 2\cos\theta$, then the value of the determinant $\Delta = \begin{vmatrix} C & 1 & 0 \\ 1 & C & 1 \\ 6 & 1 & C \end{vmatrix}$ is :

(1) $\frac{\sin 4\theta}{\sin\theta}$ (2) $4\cos^2\theta(2\cos\theta - 1)$

(3) $\frac{2\sin^2 2\theta}{\sin\theta}$ (4) None of these

27. $x + ky - z = 0, 3x - ky - z = 0$ and $x - 3y + z = 0$ has non-zero solution for k is equal to :

(1) 0 (2) 1 (3) -1 (4) None of these

28. If $A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$, then A^{-1} is equal to :

(1) $\begin{bmatrix} \frac{5}{11} & \frac{2}{11} \\ \frac{3}{11} & -\frac{1}{11} \end{bmatrix}$ (2) $\begin{bmatrix} -\frac{5}{11} & \frac{2}{11} \\ \frac{3}{11} & \frac{1}{11} \end{bmatrix}$ (3) $\begin{bmatrix} \frac{5}{11} & -\frac{2}{11} \\ -\frac{3}{11} & -\frac{1}{11} \end{bmatrix}$ (4) None of these

29. If $A = \begin{bmatrix} 1 & \log_b^a \\ \log_a^b & 1 \end{bmatrix}$, then $|A|$ is equal to :

(1) 0 (2) 1 (3) $\log_b^a$ (4) $\log_a^b$

30. If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + ...\infty}}}$, then $\frac{dy}{dx}$ is equal to :

(1) $-\frac{\cos x}{2y-1}$ (2) $\frac{\sin x}{1-2y}$ (3) $\frac{\cos x}{2y-1}$ (4) None of these

31. A lady gives a dinner party for six guests. The number of ways in which they may be selected from among ten friends, if two of the friends will not attend the party together, is :

(1) 164 (2) 140 (3) 112 (4) 40

32. If w is an imaginary cube root of unity, then $(1 + w - w^2)$ is equal to :

(1) $128w$. (2) $-128w$ (3) $-128w^2$ (4) $128w^2$

33. The equation $z\bar{z} + (2 - 3i)z + (2 + 3i)\bar{z} + 4 = 0$ represents a circle of radius :

(1) 3 (2) 4 (3) 2 (4) 6

34. If the roots of the equation $qx^2+px+q=0$ are complex, where p, q are real; then the roots of the equation $x^2-4qx+p^2=0$ are :

(1) real and equal (2) imaginary

(3) real and unequal (4) none of these

35. If $a+b=8$, then ab is greatest when :

(1) $a=3, b=5$ (2) $a=4, b=4$ (3) $a=6, b=2$ (4) None of these

36. If the coefficient of 7th and 13th term in the expansion of $(1+x)^n$ are equal, then n is equal to :

(1) 10 (2) 20 (3) 15 (4) 18

37. If ${}^nc_r$ denotes the number of combinations of n things taken r at a time, then the expression ${}^nc_{r+1}+{}^nc_{r-1}+2\times{}^nc_r$ equals :

(1) ${}^{n+2}c_r$ (2) ${}^{n+2}c_{r+1}$ (3) ${}^{n+1}c_r$ (4) ${}^{n+1}c_{r+1}$

38. The number which should be added to the numbers 2, 14, 62, so that the resulting numbers may be in G. P. is :

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

39. If the roots of the equation $x^3-12x^2+39x-28=0$ are in A. P., then their common difference is :

(1) ± 2 (2) ± 4 (3) ± 1 (4) ± 3

40. The equation of the straight line joining the origin to the point of intersection of $y-x+7=0$ and $y+2x-2=0$ is :

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

41. Let R be the relation from $A=\{2, 3, 4, 5\}$ to $B=\{3, 6, 7, 10\}$ defined by 'x divides y', then R^{-1} is equal to :

(1) $\{(6, 2), (3, 3)\}$ (2) $\{(6, 2), (10, 2)\}$

(3) $\{(6, 2), (10, 2), (3, 3), (6, 3), (10, 5)\}$ (4) None of these

42. Which of the following is a singleton set ?

(1) $\{x : |x|<1, x \in Z\}$ (2) $\{x : |x|=5, x \in Z\}$

(3) $\{x : x^2=1, x \in Z\}$ (4) $\{x : x^2+x+1=0, x \in R\}$

43. If $A = \{(x, y) : y = e^x, x \in R\}$ and $B = \{(x, y) : y = e^{-x}, x \in R\}$, then $A \cap B$ is :

(1) empty set (2) not a set (3) singleton set (4) none of these

44. If $A = \{(x, y) : x^2 + y^2 = 25\}$ and $B = \{(x, y) : x^2 + 9y^2 = 144\}$, then $A \cap B$ contains :

(1) one point (2) two points (3) three points (4) four points

45. If $z = i \log (2 - \sqrt{3})$, then $\cos z$ is equal to :

(1) i (2) 2 (3) $3i$ (4) $2i$

46. The expression $\tan^2 \alpha + \cot^2 \alpha$ is :

(1) ≥ 2 (2) ≤ 2 (3) ≥ -2 (4) None of these

47. A linear programming problem is concerned with finding the following value :

(1) only maximum value (2) optimal value

(3) only minimum value (4) none of these

48. The linear function $Z = ax + by$, where a, b are constants, which has to be maximized or minimized is called a :

(1) constraint (2) function of any type

(3) linear objective function (4) none of these

49. A compound statement is a statement which is made up of :

(1) only one statement (2) any number of statements

(3) two or more statements (4) none of these

50. A compound statement with an 'Or' is false when :

(1) one component statement is false

(2) none component statement is false

(3) both the component statements are false

(4) none of these

51. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} - 4\hat{k}$, $\vec{c} = \hat{i} + \lambda\hat{j} + 3\hat{k}$ are coplanar, then the value of λ is :

(1) $\frac{5}{3}$ (2) $\frac{3}{5}$ (3) $\frac{5}{2}$ (4) $\frac{7}{3}$

52. If $\vec{a} = 2\hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = 5\hat{i} - 3\hat{j} + \hat{k}$, then the projection of $\vec{b}$ on $\vec{a}$ is :

(1) 6 (2) 5 (3) 4 (4) 3

53. If $\vec{a}$, $\vec{b}$, $\vec{c}$ are mutually perpendicular unit vectors, then $|\vec{a} + \vec{b} + \vec{c}|$ is equal to :

(1) 3 (2) $\sqrt{3}$ (3) 1 (4) 0

54. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + \hat{j}$, $\vec{c} = \hat{i}$ and $(\vec{a} \times \vec{b}) \times \vec{c} = \lambda \vec{a} + \mu \vec{b}$, then $\lambda + \mu$ is equal to :

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

55. A variable plane moves, so that the sum of the reciprocals of its intercepts on the coordinates axes is $\frac{1}{2}$. Then the plane passes through :

(1) $\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{2}\right)$ (2) $(-1, 1, 1)$ (3) $(2, 2, 2)$ (4) $(0, 0, 0)$

56. The equation of the plane which bisects the line joining (2, 3, 4) and (6, 7, 8) is :

(1) $x + y + z - 15 = 0$ (2) $x + y + z + 15 = 0$

(3) $x - y - z - 15 = 0$ (4) $x - y + z - 15 = 0$

57. The direction ratio of normal to the plane through (1, 0, 0), (0, 1, 0) which makes an angle $\frac{\pi}{4}$ with plane $x + y = 3$ are :

(1) $1, \sqrt{2}, 1$ (2) $1, 1, \sqrt{2}$ (3) $1, 1, 2$ (4) $\sqrt{2}, 1, 1$

58. A line makes the same angle θ, with each of the x and z axes. If the angle β which it makes with y-axis is such that $\sin^2\beta = 3\sin^2\theta$, then $\cos^2\theta$ is equal to :

(1) $\frac{2}{5}$ (2) $\frac{1}{5}$ (3) $\frac{2}{3}$ (4) $\frac{3}{5}$

59. The solution of $\frac{dy}{dx} = 2^{y-x}$ is :

(1) $2^x + 2^y = C$ (2) $\frac{1}{2^x} - \frac{1}{2^y} = C$ (3) $2^x - 2^y = C$ (4) None of these

60. $y + x^2 = \frac{dy}{dx}$ has the solution :

(1) $y + x^2 + 2x + 2 = ce^x$ (2) $y + 2x = ce^x$

(3) $y + 2x + 2 = ce^x$ (4) None of these

61. Five horses are in the race. Mr. B selects two of the horses at random and bets o them. The probability that Mr. B selected the winning horse, is :

(1) $\frac{1}{5}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) None of these

62. If A and B are events such that $P(A \cup B)=\frac{3}{4}$, $P(A \cap B)=\frac{1}{4}$, $P(\overline{A})=\frac{2}{3}$, then $P(\overline{A} \cap B$ is :

(1) $\frac{5}{12}$ (2) $\frac{3}{8}$ (3) $\frac{5}{8}$ (4) $\frac{1}{4}$

63. A coin is tossed three times. The probability of getting head and tail alternatively, is

(1) $\frac{1}{8}$ (2) $\frac{1}{2}$ (3) $\frac{1}{4}$ (4) None of these

64. Seven white balls and three black balls are randomly placed in a row. The probabili that no two black balls are placed adjacently, equals :

(1) $\frac{1}{13}$ (2) $\frac{2}{15}$ (3) $\frac{7}{15}$ (4) $\frac{1}{2}$

65. The solution set of the equation $\sin^{-1} x = 2\tan^{-1} x$ is :

(1) $\{1, 2\}$ (2) $\{-1, 2\}$ (3) $\{-1, 1, 0\}$ (4) $\left\{1, \frac{1}{2}, 0\right\}$

66. $\tan\left[\frac{1}{2}\sin^{-1}\left(\frac{2a}{1+a^2}\right)+\frac{1}{2}\cos^{-1}\left(\frac{1-a^2}{1+a^2}\right)\right]$ is equal to :

(1) $\frac{2a}{1+a^2}$ (2) $\frac{2a}{1-a^2}$ (3) $\frac{1-a^2}{1+a^2}$ (4) $\frac{1+a^2}{1-a^2}$

67. $\tan^{-1}\frac{x}{y}-\tan^{-1}\frac{x-y}{x+y}; (x>y>0)$ is equal to :

(1) $\frac{3\pi}{4}$ (2) $-\frac{\pi}{4}$ (3) $-\frac{3\pi}{4}$ (4) $\frac{\pi}{4}$

68. If in a triangle ABC, $\angle A = \tan^{-1} 2$ and $\angle B = \tan^{-1} 3$, then angle C is equal to :

(1) $\frac{\pi}{4}$ (2) $\frac{3\pi}{4}$ (3) $-\frac{\pi}{4}$ (4) None of these

69. For real numbers x and y, we write $xRy \Leftrightarrow x^2 - y^2 + \sqrt{3}$ is an irrational number. Then the relation R, is :

(1) Transitive (2) Reflexive (3) Symmetric (4) None of these

70. A function f from the set of natural numbers to integers defined by $f(x) = \begin{cases} \frac{n-1}{2}, & \text{when } n \text{ is odd} \\ -\frac{n}{2}, & \text{when } n \text{ is even} \end{cases}$ is :

(1) one-one but not onto (2) onto but not one-one

(3) one-one and onto both (4) none of these

71. If two sets A and B are having 99 elements in common, then the number of elements common to each of the sets $A \times B$ and $B \times A$ are :

(1) 99^2 (2) 18 (3) 2^{99} (4) 100

72. If $f(x) = 1 - \frac{1}{x}$, then the value of $f\left[f\left(\frac{1}{x}\right)\right]$ is :

(1) $\frac{1}{x} - 1$ (2) $\frac{x}{1-x}$ (3) $\frac{x-1}{x}$ (4) $\frac{x}{x-1}$

73. The function $f(x) = \log\left(x + \sqrt{x^2+1}\right)$ is :

(1) an even function (2) an odd function

(3) a periodic function (4) none of these

74. The value of $\sin A \sin(60° + A) \sin(60° - A)$ is equal to :

(1) $\sin 3A$ (2) $\sin\frac{3A}{2}$ (3) $\sin\frac{3A}{4}$ (4) $\sin\frac{4A}{3}$

75. If $\cos\theta = \frac{1}{2}\left(x + \frac{1}{x}\right)$, then $\frac{1}{2}\left(x^2 + \frac{1}{x^2}\right)$ is equal to :

(1) $\cos 2\theta$ (2) $\sin 2\theta$ (3) $\sec 2\theta$ (4) $\tan 2\theta$

76. If $y = \sin^2\theta + \text{cosec}^2\theta, \theta \neq 0$, then :

(1) $y > 2$ (2) $y \leq 2$ (3) $y \geq -2$ (4) $y = 0$

77. The value of $\frac{\cos 12^\circ - \sin 12^\circ}{\cos 12^\circ + \sin 12^\circ} + \frac{\sin 147^\circ}{\cos 147^\circ}$ is equal to :

(1) 0 (2) -1 (3) 1 (4) None of these

78. $P(n) : 1 + 3 + 5 + \ldots\ldots + (2n-1) = n^2$ is :

(1) true for $n > 1$ (2) true for no n

(3) true for all $n \in N$ (4) none of these

79. If eleven members of a committee sit at a round table so that the President and Cashier always sit together, then the number of arrangements is :

(1) $\lfloor 10 \times 2$ (2) $\lfloor 9 \times 2$ (3) $\lfloor 10$ (4) None of these

80. In how many ways can 5 keys be put in a ring ?

(1) $\lfloor 5$ (2) $\frac{\lfloor 5}{2}$ (3) $\lfloor 4$ (4) $\frac{\lfloor 4}{2}$

81. The straight line whose sum of the intercepts on the axes is equal to half of the product of the intercepts, passes through the point :

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

82. The equation of a circle with centre (1, 2) and tangent $x + y - 5 = 0$ is :

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

(3) $x^2 + y^2 - 2x + 4y + 8 = 0$ (4) $x^2 + y^2 - 2x - 4y + 8 = 0$

83. The distance between the foci of an ellipse is 16 and the eccentricity is $\frac{1}{2}$. Length of major axis of the ellipse is :

(1) 8 (2) 16 (3) 32 (4) 64

84. The ratio in which the line joining (2, 4, 5) and (3, 5, – 4) is divided by the yz-plane is :

(1) 4 : –3 (2) 3 : 2 (3) 2 : 3 (4) –2 : 3

85. A plane makes intercepts 3 and 4 respectively on z-axis and x-axis. If plane is parallel to y-axis, then its equation is :

(1) $3z + 4x = 12$ (2) $3y + 4z = 12$ (3) $3x + 4z = 12$ (4) $3z + 4y = 12$

86. $\lim_{x\to 0} \frac{\int_0^x y\,dy}{x\tan(\pi+x)}$ is equal to :

(1) 2 (2) $\frac{1}{2}$ (3) -2 (4) None of these

87. The points of discontinuity of $\tan x$ are :

(1) $x = n\pi$ (2) $2n\pi$ (3) $(2n+1)\frac{\pi}{2}$ (4) $-2n\pi$

where $n \in I$

88. If $xy = e^{x-y}$, then $\frac{dy}{dx}$ is equal to :

(1) $\frac{(x-1)y}{x(1+y)}$ (2) $\frac{(x+1)y}{x(1+y)}$ (3) $\frac{(x-1)y}{x(1-y)}$ (4) None of these

89. If $y = \frac{1+\sin x-\cos x}{1+\sin x+\cos x}$, then $\frac{dy}{dx}$ is equal to :

(1) $\frac{1}{\cos x}$ (2) $\frac{1}{\sin x}$ (3) $\frac{1}{1-\cos x}$ (4) None of these

90. If $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$, then A^{100} is equal to :

(1) $2^{100}A$ (2) $100\,A$ (3) $2^{99}A$ (4) $299\,A$

91. If $f(x) = x + 2$, then $f'[f(x)]$ at $x = 4$ is :

(1) 8 (2) 1 (3) 4 (4) 5

92. The value of $\frac{d}{dx}\left[\left(\frac{\tan^2 2x-\tan^2 x}{1-\tan^2 2x\tan^2 x}\right)\cot 3x\right]$ is :

(1) $\sec x$ (2) $\sec^3 x$ (3) $\sec x\tan x$ (4) $\sec^2 x$

93. If $x = a\sin\theta$, $y = b\cos\theta$, then $\frac{d^2y}{dx^2}$ is equal to :

(1) $\frac{b}{a^2}\sec\theta$ (2) $-\frac{b}{a^2}\sec^3\theta$ (3) $\frac{b}{a}\sec^2\theta$ (4) None of these

94. If $x^m y^n = (x+y)^{m+n}$, then $\frac{dy}{dx}$ is :

(1) $\frac{y}{x}$ (2) $\frac{x}{y}$ (3) xy (4) None of these

95. Maximum slope of the curve $y = -x^3 + 3x^2 + 9x - 27$ is :

(1) 0 (2) 16 (3) 12 (4) 32

96. The function x^x is increasing, when :

(1) $x > \frac{1}{e}$ (2) $x < \frac{1}{e}$ (3) $x < 0$ (4) None of these

97. The rate of change of the surface area of a sphere of radius r, when the radius is increasing at the rate of 2 cm/s is proportional to :

(1) $\frac{1}{r}$ (2) r^2 (3) r (4) $\frac{1}{r^2}$

98. Angle between the tangents to the curve $y = x^2 - 5x + 6$ at the points (2, 0) and (3, 0) is :

(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{4}$

99. $\int \frac{(x+1)^2}{x(x^2+1)} dx$ is equal to :

(1) $\log x + C$ (2) $2\tan^{-1} x + C$ (3) $\log \frac{1}{1+x^2} + C$ (4) None of these

100. $\int \frac{x + \sin x}{1 + \cos x} dx$ is equal to :

(1) $x \tan \frac{x}{2} + C$ (2) $\tan \frac{x}{2} + C$ (3) $\log \cos \frac{x}{2}$ (4) None of these