B.TECH. LET (MATHEMATICS)

1. If $\sin(A+iB) = x+iy$, then $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} =$

(A) 1
(B) 2
(C) −1
(D) 0

2. The empirical relation between Mean, Median and Mode of any probability distribution is

(A) Mean – Mode = 3(Mean – Median)
(B) Mean – Mode = 3(Mean + Median)
(C) Mean + Mode = 3(Mean – Median)
(D) Mean + Mode = 3(Mean + Median)

3. 5 men out of 100 and 25 women out of 1000 are blind. A colour blind person is chosen at random, the probability that the person chosen is a male is

(A) $\frac{2}{3}$

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

(C) $\frac{2}{5}$

(D) $\frac{1}{5}$

4. The rank of the matrix $\begin{bmatrix} 1 & 3 & 4 \\ -2 & -6 & -8 \\ 3 & 9 & 12 \end{bmatrix}$ is

(A) 2
(B) 3
(C) 0
(D) 1

5. $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x =$

(A) e

(B) $-e$

(C) $\frac{1}{e}$

(D) 0

6. The sum of the series $\frac{1}{1.2}-\frac{1}{2.3}+\frac{1}{3.4}-\frac{1}{4.5}+...$ is

(A) 2 log 2
(B) log 2 – 1
(C) 1
(D) 2 log2 – 1

7. $\lim_{x\to 1}\frac{x^{\frac{1}{3}}-1}{x-1} =$

(A) $\frac{2}{3}$

(B) $-\frac{2}{3}$

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

(D) $-\frac{1}{3}$

8. Let $f : R \to R$ be a function defined by $f(x) = 2x + 1$. Then $f^{-1}(x) =$

(A) $\frac{x+1}{2}$

(B) $x+1$

(C) $\frac{x-1}{2}$

(D) $x-1$

9. The general solution of the differential equation $\frac{dy}{dx} = e^{x+y}$ is

(A) $e^x + e^{-y} = c$
(B) $e^x + e^y = c$
(C) $e^{-x} + e^y = c$
(D) $e^{-x} + e^{-y} = c$

10. The vectors $2\vec{i} + \alpha\vec{j} + \vec{k}$ and $2\vec{i} - \vec{j} - \vec{k}$ are perpendicular if

(A) $\alpha = 5$
(B) $\alpha = -5$
(C) $\alpha = -3$
(D) $\alpha = 3$

11. If $2P(A) = P(B) = \frac{5}{13}$ and $P(A/B) = \frac{2}{5}$, then $P(A \cup B) =$

(A) $\frac{9}{26}$
(B) $\frac{7}{26}$
(C) $\frac{11}{26}$
(D) $\frac{5}{26}$

12. The value of $\begin{vmatrix} a^2+2a & 2a+1 & 1 \\ 2a+1 & a+2 & 1 \\ 3 & 3 & 1 \end{vmatrix}$ is

(A) $(a-1)^3$
(B) $(a-1)^2$
(C) $(a-1)$
(D) $(a-1)^4$

13. The function $f(x) = x^2 - x + 1$ in [0, 1] is

(A) increasing
(B) decreasing
(C) neither increasing nor decreasing
(D) either increasing or decreasing

14. The point of inflection if any, of the function $y = x^3 - 3x + 2$ is

(A) (0, 1)
(B) (1, 2)
(C) (0, 2)
(D) (1, 0)

15. The probability of obtaining an even prime number on each die, when a pair of dice rolled is

(A) 0
(B) $\frac{1}{3}$
(C) $\frac{1}{12}$
(D) $\frac{1}{36}$

16. The equation of lowest degree with rational coefficients, whose roots are $1+\sqrt{2}$ and 3 is

(A) $x^3 + 5x^2 + 5x - 3 = 0$
(B) $x^3 + 5x^2 + 5x + 3 = 0$
(C) $x^3 + 5x^2 - 5x + 3 = 0$
(D) $x^3 - 5x^2 + 5x + 3 = 0$

17. If $A = \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix}$, then $A^2 - 8I$ is

(A) 6A
(B) 7A
(C) 8A
(D) 9A

18. If $A = \begin{pmatrix} 2 & 5 \\ 1 & 7 \end{pmatrix}$ then $\det(A^{-1})$ is

(A) 0.11
(B) 0.9
(C) 19
(D) 11

19. The second derivative of $\log(\cos x)$ is

(A) $-\tan x$
(B) $\tan^2 x$
(C) $\sec x$
(D) $-\sec^2 x$

20. The larger of two consecutive odd integers is three times the smaller. Then their sum is

(A) 2
(B) 4
(C) 6
(D) 8

21. The order and degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{dy}{dx}\right)^3 - e^x = 0$ are respectively

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

22. If the directional cosines of a line are $\frac{1}{c}, \frac{1}{c}, \frac{1}{c}$ then c is

(A) ± 3
(B) $\pm\sqrt{3}$
(C) $c > 0$
(D) $0 < c < 1$

23. A function f has property that $f(3x-1)=x^2+x+1$ for all real x. Then $f(5)$ is

(A) 7
(B) 13
(C) 31
(D) 111

24. Consider the system of linear equations:

$$(a+b)x-(a-b)y=4ab;\ (a-b)x+(a+b)y=2(a^2-b^2)\ .$$

Then the system has

(A) unique solution
(B) exactly two solutions
(C) infinitely many solutions
(D) no solution

25. The value of x for which $A=\begin{pmatrix}1 & -3 & 2\\ 4 & -1 & x\\ 3 & 5 & 2\end{pmatrix}$ is singular

(A) $\frac{31}{7}$

(B) $\frac{32}{7}$

(C) $\frac{33}{7}$

(D) $\frac{34}{7}$

26. A conic with eccentricity e is called hyperbolic if and only if

(A) $e=0$
(B) $e=1$
(C) $e>1$
(D) $e<1$

27. Polar form of $z=-\pi$ is

(A) $-\pi$
(B) $\pi(\cos\pi+i\sin\pi)$
(C) $-\pi(\cos\pi+i\sin\pi)$
(D) π

28. A positive x has property that $x\%$ of x is 4. Then x is

(A) 2
(B) 4
(C) 10
(D) 20

29. Differential equation for family of all straight lines passing through the origin is

(A) $y = x\frac{dy}{dx}$

(B) $\frac{d^2y}{dx^2} - y = 0$

(C) $y = 2x\frac{dy}{dx}$

(D) $y = 3x\frac{dy}{dx}$

30. Product of n roots of n^{th} roots of unity is equal to

(A) 0
(B) -1
(C) $(-1)^{n-1}$
(D) $(-1)^n$

31. A homogeneous system of linear equation $AX = 0$

(A) has trivial solution if $|A| = 0$
(B) has non trivial solution if $|A| \neq 0$
(C) is always consistent
(D) may be inconsistent

32. The function $f(x) = x^2 - 2x - 15$ is

(A) increasing in $(-\infty, 1)$
(B) decreasing in $(1, \infty)$
(C) increasing in $[1, \infty]$
(D) decreasing in $(-\infty, 1)$

33. $f(x) = x^4 - 62x^2 + ax + 9$ attains its maximum at $x = 1$ in $[0, 2]$. Then the value of a is

(A) 120
(B) 130
(C) 140
(D) 150

34. If cos x is the integrating factor of the linear differential equation $\frac{dy}{dx} + Py = Q,$ then P is

(A) log sin x
(B) cos x
(C) $-\tan x$
(D) tan x

35. The solution of differential equation $\frac{dy}{dx} = \frac{-x}{y}$ is

(A) $x^2 - y^2 = r^2$
(B) $x^2 + y^2 = r^2$
(C) $x^2 - y^2 + xy = 2r^2$
(D) $x^2 + y^2 + xy = r^2$

36. The number of subsets of {2, 3, 4, 5, 6, 7, 8, 9} that contains at least one prime is

(A) 16
(B) 32
(C) 64
(D) 240

37. If the system of equations $x + ay = 0$, $az + y = 0$, $ax + z = 0$ has infinite number of solutions, then the value of a is

(A) 0
(B) -1
(C) 1
(D) ∞

38. Number of integer values of x that satisfy $|x| < 3\pi$ is

(A) 9
(B) 10
(C) 18
(D) 19

39. If $x = a + b$, $y = a\omega + b\omega^2$, $z = a\omega^2 + b\omega$, then xyz is

(A) $(a + b)^3$

(B) $a^3 + b^3$

(C) $a^3 - b^3$

(D) $(a + b)^3 + 3ab(a + b)$

40. The values of $(16)^{\frac{1}{4}}$ are

(A) $\pm 2, \pm 2i$

(B) $\pm 4, \pm 4i$

(C) $\pm 1, \pm i$

(D) $\pm 3, \pm 3i$

41. $\log_e\left(\frac{1+3x}{1-2x}\right)$ is

(A) $-5x-\frac{5x^2}{2}-\frac{35x^3}{3}-...$

(B) $-5x+\frac{5x^2}{2}-\frac{35x^3}{3}+...$

(C) $5x-\frac{5x^2}{2}+\frac{35x^3}{3}-...$

(D) $5x+\frac{5x^2}{2}+\frac{35x^3}{3}+...$

42. If the function $f(x)=e^{-x}$, then $\frac{f(-a)}{f(b)}$ is equal to

(A) $f(a + b)$

(B) $f(a - b)$

(C) $f(-a + b)$

(D) $f(-a - b)$

43. The value of $\frac{\sec 8\theta - 1}{\sec 4\theta - 1}$ is equal to

(A) $\frac{\tan 2\theta}{\tan 8\theta}$

(B) $\frac{\tan 8\theta}{\tan 4\theta}$

(C) $\frac{\tan 8\theta}{\tan 2\theta}$

(D) $\frac{\tan 6\theta}{\tan 2\theta}$

44. Seven balls are drawn simultaneously from a bag containing 5 white and 6 green balls. The probability of drawing 3 white and 4 green balls is

(A) $\frac{7}{{}^{11}C_7}$

(B) $\frac{{}^5C_3 + {}^6C_4}{{}^{11}C_7}$

(C) $\frac{{}^5C_3 \; {}^6C_2}{{}^{11}C_7}$

(D) $\frac{{}^6C_3 \; {}^5C_4}{{}^{11}C_7}$

45. The maximum value of $3 \cos x + 4 \sin x + 5$ is

(A) 5
(B) 7
(C) 9
(D) 10

46. The integrating factor of the differential equation $(y \log y)dx = (\log y - x)dy$ is

(A) $\frac{1}{\log y}$

(B) $\log(\log y)$

(C) $1 + \log y$

(D) $\log y$

47. The solution of the differential equation $\frac{dy}{dx} = \sin(x+y)\tan(x+y) - 1$ is

(A) $\text{cosec}(x+y) + \tan(x+y) = x + c$
(B) $x + \text{cosec}(x+y) = c$
(C) $x + \tan(x+y) = c$
(D) $x + \sec(x+y) = c$

48. The function $f(x) = e^{ax} + b$ is strictly decreasing for all $x \in R$ iff

(A) $a = 0$
(B) $a < 0$
(C) $a > 0$
(D) $a \leq 0$

49. The area enclosed within the curve $|x| + |y| = 1$ is

(A) 2
(B) 1
(C) 4
(D) ∞

50. If a point $P(2,5)$ is shifted by a distance $\sqrt{2}$ units parallel to the line $y = x$, then coordinates of *P* in the new position are

(A) (2, 5)
(B) (3, 6)
(C) $(3+\sqrt{2}, 6+\sqrt{2})$
(D) $(3-\sqrt{2}, 6-\sqrt{2})$

ENGLISH
(FINAL)

51. What is the plural form of 'baby'?

(A) baby
(B) babies
(C) babys
(D) babie

52. Which of the following is a definite article?

(A) A
(B) An
(C) The
(D) None of the above

53. Give one-word substitute for ‘A sentimental longing for the past.’

(A) Nostalgia
(B) Philanthropy
(C) Gourmet
(D) Pessimist

54. Identify the word that consists of the silent letter ‘d’.

(A) Thunder
(B) Melody
(C) Handsome
(D) Debt

55. Choose the correct Synonym for the word: **Kind**

(A) Loyal
(B) Honest
(C) Compassionate
(D) Mild

56. Choose the Antonym for the word: **Sane**

(A) Brave
(B) Obedient
(C) Good
(D) Crazy

57. Which of these is a synonym for “Cautious”?

(A) Reckless
(B) Careful
(C) Confident
(D) Bold

58. Which of these is an example of word formation using a prefix?

(A) Treatment
(B) Misconduct
(C) Alcoholic
(D) Quickly

59. Identify the word that is formed using a suffix.

(A) Disagree
(B) Submarine
(C) Logical
(D) Mislead

60. What does the prefix ‘un’ usually signify in a word?

(A) Time or order
(B) Opposite or negative
(C) Showing reversal of action
(D) Tense of the sentence

61. Which of the following is an example of contraction?

(A) ATM
(B) Can’t
(C) CEO
(D) PhD

62. The idiom ‘once in a blue moon’ refers to

(A) A never-ending situation
(B) Very rarely
(C) To be in trouble
(D) A joyous day

63. Which of these is a compound word?

(A) Nourishment
(B) Treatment
(C) Administration
(D) Lifestyle

64. Identify the verb in the sentence:

The tall, green tree swayed in the wind.

(A) tree
(B) tall
(C) wind
(D) swayed

65. Choose the sentence with the correct subject-verb agreement.

(A) The books on the shelf is mine.
(B) The books on the shelf are mine.
(C) The books on the shelves is mine.
(D) The books on the shelves was mine.

66. Which of the following words is a connective that indicates contrast?

(A) Therefore
(B) However
(C) Furthermore
(D) Additionally

67. Although he was tired, he continued with his work. The underlined word is

(A) Adverb
(B) Preposition
(C) Conjunction
(D) Verb

68. Choose the right contraction for 'I had'

(A) I'd
(B) Id
(C) Í hd
(D) I'd'

69. Which of these is not a punctuation?

(A) Parenthesis
(B) Question mark
(C) Apostrophe
(D) Underline

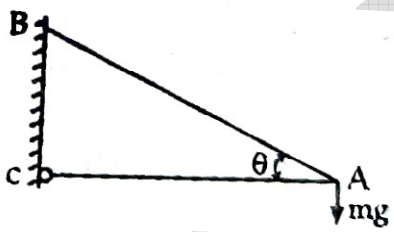
70. Fill in the blanks:

The room is …….. spacious.

(A) Quite
(B) Quiet
(C) Quit
(D) Quote

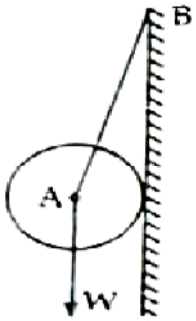
ENGINEERING MECHANICS
(FINAL)

71. For the loaded system as shown in figure, the force induced in the string *AB* would be



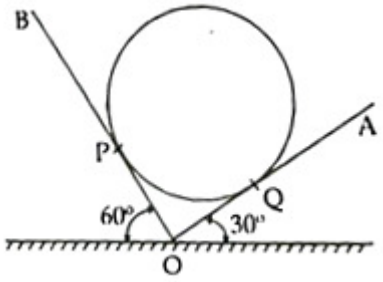
(A) $mg \tan\theta$
(B) $mg \sec\theta$
(C) $mg \sin\theta$
(D) mg cosec θ

72. A circular roller of weight *W* hangs by a tie rod and rests against a smooth vertical wall as shown in figure. The tension in the tie rod *AB* will be



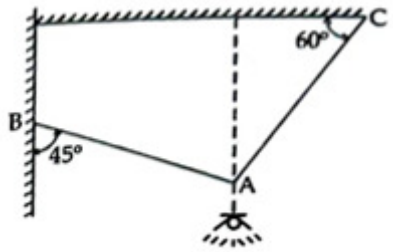
(A) less than *W*
(B) greater than *W*
(C) equal to *W*
(D) data insufficient to make force analysis

73. A sphere of weight 400 N rests in a groove formed by two planes *OA* and *OB* and these planes are inclined at 30° and 60° respectively with the horizontal as shown in figure. The reaction on plane *OB* will be about



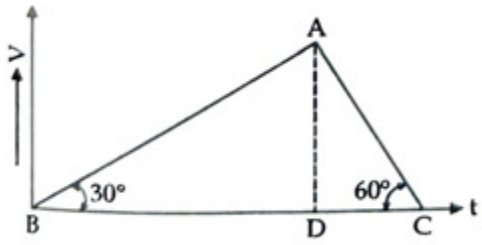
(A) 125 N
(B) 160 N
(C) 200 N
(D) 345 N

74. An electric light fixture weighing 150 N hangs from a point *A* by two strings *AB* and *AC* as shown in figure. The tension in the string *AB* would be approximately



(A) 77 N
(B) 46 N
(C) 98 N
(D) 109 N

75. The velocity time graph of a particle moving along a straight line is shown in figure. The distances covered during the time intervals *BD* and *DC* conform to the ratio



(A) $\sqrt{2}:1$
(B) $\sqrt{3}:2$
(C) 3:1
(D) 2:1

76. The particle executing simple harmonic motion of amplitude 1 cm has a velocity of 10 cm/s when passing through the mean position. The frequency of motion is

(A) $\frac{5}{\pi}$

(B) $\frac{5}{2\pi}$

(C) $\frac{\sqrt{5}}{\pi}$

(D) $\frac{\sqrt{10}}{\pi}$

77. A particle executes simple harmonic motion with displacement at any time t prescribed by the relation $y = r.\sin(\omega t)$; where r is the amplitude and ω is the angular velocity. The velocity of particle is

(A) $\omega\sqrt{(r^2 - y^2}$

(B) $\omega(r^2 - y^2)^{1/4}$

(C) $\frac{\omega}{\sqrt{(r^2 - y^2)}}$

(D) $\omega.(r^2 - y^2)$

78. Two simple harmonic motions are represented by the equations;

$x_1 = 6.(\sin 3\pi t + \sqrt{3}.\cos 3\pi t)$ and $x_2 = 12\sin(\pi t + \frac{\pi}{4})$.

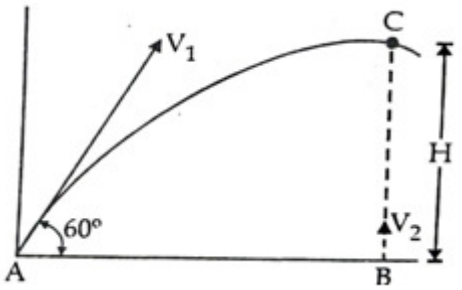
Their amplitudes are in the ratio

(A) 1:2
(B) 2:3
(C) 1:1
(D) $\sqrt{2}:1$

79. Two stones are projected from the same point with the same speed but at angles of π/3 and π/6 respectively. If their ranges are R_1 and R_2, then

(A) $R_1 = 2\ R_2$
(B) $R_1 = R_2$
(C) $R_1 = 0.5\ R_2$
(D) $R_1 = 0.25\ R_2$

80. A particle is projected with velocity V_1 from point A making an angle of 60^o with horizontal. Simultaneously another particle is thrown vertically upwards with velocity V_2 from point B. Both the particles reach the highest point on the parabolic path of the first particle at the same time as shown in figure. The ratio of V_2 / V_1 is



(A) $1:\sqrt{3}$
(B) $\sqrt{2}:1$
(C) $\sqrt{3}:2$
(D) $2:1$

81. A stone tied to the end of a string 100 cm long is whirled in a horizontal circle with a constant speed. If the stone makes 15 revolutions in 30 seconds, the acceleration of the stone is closest to

(A) 315 cm/s^2
(B) 630 cm/s^2
(C) 986 cm/s^2
(D) 3950 cm/s^2

82. An aircraft executes a horizontal loop of radius 1 km with a steady speed of 900 km/hr. In terms of acceleration due to gravity (g = 10 m/s^2), the centripetal acceleration of aircraft would be

(A) 3.12 g
(B) 6.25 g
(C) 12.5 g
(D) 18.75 g

83. For a particle moving in a circular orbit of radius 0.4 m, the angular velocity and angular acceleration at a particular instant are 2 rad/s and 5 rad/s^2. The particle then has a total linear acceleration of

(A) 1.9 m/s^2
(B) 2.56 m/s^2
(C) 3.8 m/s^2
(D) 7.24 m/s^2

84. A ball weighing 0.14 kg is being whirled in a horizontal circle at the end of a string 0.5 m long. If the breaking tension of the string is 35 N, the maximum angular velocity with which the stone can be whirled is approximately

(A) 12.9 rad/s
(B) 15.8 rad/s
(C) 22.4 rad/s
(D) 31.6 rad/s

85. A body of mass m attached to a string of length l constitutes a simple pendulum. At the instant when the bob acquires maximum speed v while executing simple harmonic motion, the tension in the string equals

(A) $mg + mv^2$
(B) $mg + mv^2/2l$
(C) $mg + mv^2/l$
(D) $mg + 2mv^2/l$

86. A train running at 48 km/hr has to negotiate a curve of 400 m radius. If the distance between the rails is 1 m, by how much should the outer rail be raised with respect to the inner rail? (Take g = 10 m/s^2)

(A) 2.22 cm
(B) 4.44 cm
(C) 6.66 cm
(D) 8.88 cm

87. Starting from rest, a particle travels on a circular path and the distance covered is prescribed by the relation $s = kt^2$, where k is constant and t is the time. The particle then has a tangential acceleration of

(A) $\frac{k}{2}$

(B) k

(C) $2k$

(D) $4k$

88. A planet is revolving in an elliptical orbit about the sun, and its closest and farthest distances from the sun are r and R respectively. If v and V represent the velocities of the planet at the closest and farthest distances from the sun, then the ratio of v/V is

(A) $\frac{r}{R}$

(B) $\frac{R}{r}$

(C) $\sqrt{\left(\frac{R}{r}\right)}$

(D) $\left(\frac{R}{r}\right)^2$

89. A body of mass M consists of elemental portions of masses $m_1, m_2, \ldots\ldots$ and these masses lie at distances $x_1, x_2 \ldots\ldots$ from a fixed straight line called axis. The moment of inertia of the body about that axis is

(A) $\sum mx$

(B) $\sum mx^2$

(C) $\frac{\sum mx^2}{\sum mx}$

(D) $\frac{\sum m^2 x}{\sum m}$

90. The moment of inertia of a thin circular ring with radius r and mass m about an axis through its centre and perpendicular to its plane would be

(A) mr^2

(B) $\frac{mr^2}{2}$

(C) $1.5mr^2$

(D) $1.25mr^2$

91. Consider a circular cylinder of mass m, radius r and length l. The moment of inertia with respect to central longitudinal axis would be

(A) $\frac{mr^2}{2}$

(B) $\frac{mr^2}{3}$

(C) $\frac{mr^2}{6}$

(D) $\frac{mr^2}{12}$

92. For a rectangular element with sides b and h, the moment of inertia about its centroidal axis parallel to side b would be

(A) $\frac{bh^3}{3}$

(B) $\frac{bh^3}{12}$

(C) $\frac{bh^3}{24}$

(D) $\frac{bh^3}{36}$

93. Corresponding to the polar area moment of inertia for the area of a ring of radii r_1 and r_2, the radius of gyration would be

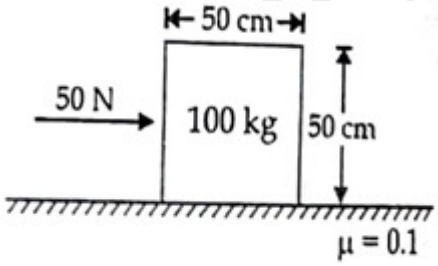
(A) $\dfrac{\sqrt{\left(r_1^2 + r_2^2\right)}}{\sqrt{2}}$

(B) $\dfrac{\sqrt{\left(r_1^2 + r_2^2\right)}}{2}$

(C) $2.\sqrt{\left(r_1^2 + r_2^2\right)}$

(D) $\sqrt{2}.\sqrt{\left(r_1^2 + r_2^2\right)}$

94. A block of mass 100 kg rests on a floor and the static coefficient of friction for the contact surfaces is 0.1. It is acted upon by a horizontal force of 50 N as shown in figure. The frictional force developed along the contact surface is



(A) 0 N
(B) 50 N
(C) 98 N
(D) 980 N

95. A box is given a push along a surface on which it rests, with a velocity of 6 m/s. If it stops after covering a distance of 5 m (g = 10 m/s^2), the coefficient of friction between the box and the surface is

(A) 0.24
(B) 0.36
(C) 0.45
(D) 0.58

96. A car is moving along a straight horizontal road with speed v. If the coefficient of friction between the tyres and road is μ, the shortest distance in which the car can stop is

(A) $\frac{v^2}{2\mu g}$

(B) $\frac{v}{\mu g}$

(C) $\left(\frac{v}{2\mu g}\right)^2$

(D) $\left(\frac{v}{2\mu g}\right)^{1/2}$

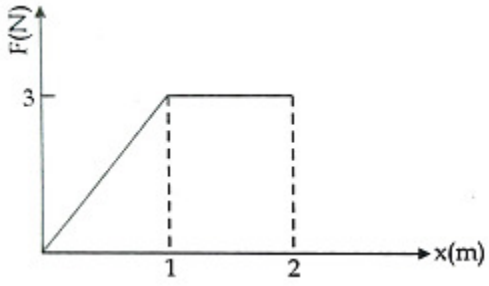
97. Mark the wrong statement:

(A) The maximum force of friction is independent of the magnitude of area in contact between the surfaces
(B) Coefficient of friction between two surfaces is a constant of proportionality between the limiting force of friction and the normal reaction
(C) The coefficient of static friction must be less than the coefficient of dynamic friction for a given pair of bodies
(D) If a block slides over an inclined plane, the reaction by the plane on the block may not be in line with the force due to weight

98. A block of weight 44 N, is thrust up a 30 degree inclined plane with an initial speed of 5 m/s. It travels a distance of 1.5 m before it comes to rest. The frictional force acting upon it would be

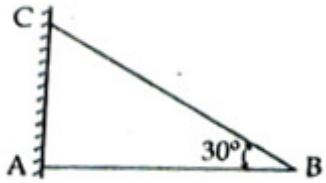
(A) 9.5 N
(B) 12.6 N
(C) 15.3 N
(D) 18.7 N

99. Figure depicts the variation of force on a particle of 1 kg mass which starts from rest from the origin. The velocity of the particle at $x = 2$ m will be



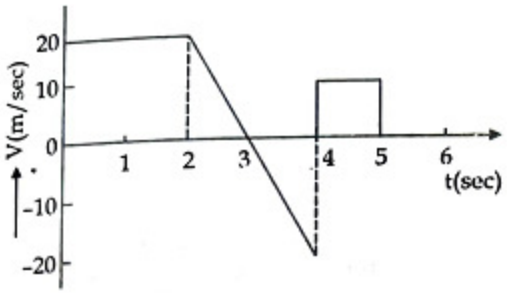
(A) $\sqrt{3}\,m/s$
(B) $3\,m/s$
(C) $\sqrt{6}\,m/s$
(D) $4.5\,m/s$

100. A bar AB of weight 120 N is hinged at A to a vertical wall and held in horizontal position by a chord BC as shown in figure. The tension in chord BC will be



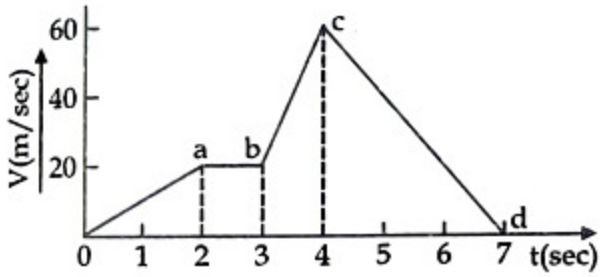
(A) 60 N
(B) 80 N
(C) 120 N
(D) 200 N

101. The velocity time graph of an object moving along a straight path is shown in figure. The displacement of the object in time interval $t = 0$ to $t = 5$ seconds is



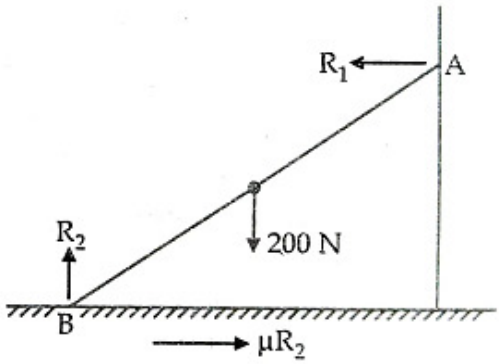
(A) 20 m
(B) 30 m
(C) 40 m
(D) 50 m

102. The velocity time graph of an object moving along a straight line is shown in figure. The retardation of the object is



(A) 10 m/s^2
(B) 20 m/s^2
(C) 40 m/s^2
(D) 0 m/s^2

103. A ladder weighing 200 N is placed against a smooth vertical wall and a rough horizontal floor ($\mu = 0.25$) as shown in figure. If the ladder is just on the point of sliding, then the reaction at point B will be



(A) 10 N
(B) 200 N
(C) 50 N
(D) 25 N

104. Periodic time of a particle moving with simple harmonic motion is the time taken by the particle for

(A) quarter oscillation
(B) half oscillation
(C) complete oscillation
(D) two oscillations

105. The dimensional formula ML^2T^{-3} represents

(A) work
(B) power
(C) force
(D) momentum

106. Four forces P, 2P, 3P and 4P act along the sides, taken in order, of a square. The resultant force is

(A) Zero
(B) $2\sqrt{2}\,P$
(C) $2P$
(D) $\sqrt{5}\,P$

107. A car P moving at 45 m/s chases another car *Q* moving at 70 m/s ahead of it in the same direction. A man in car *P* fires a bullet at car *Q*. If the muzzle speed of bullet is 80 m/s, the speed with which the bullet hits car Q is

(A) 25 m/s
(B) 35 m/s
(C) 55 m/s
(D) 105 m/s

108. Newton's second law of motion connects

(A) change of momentum and velocity
(B) momentum and acceleration
(C) momentum and rate of change of force
(D) rate of change of momentum and external force

109. Newton's first law of motion gives the concept of

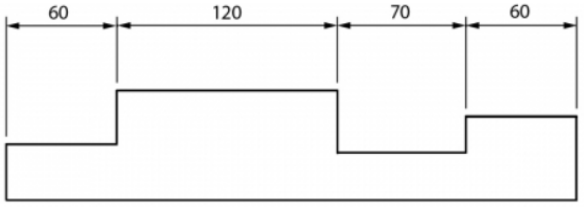
(A) work
(B) force
(C) inertia
(D) energy

110. Which of the following physical quantities is not a vector?

(A) Mass
(B) Momentum
(C) Impulse
(D) Acceleration

ENGINEERING GRAPHICS
(FINAL)

111. The dimensioning method shown below is known as



(A) Parallel dimensioning
(B) Chain dimensioning
(C) Superimposed dimensioning
(D) Running dimensioning

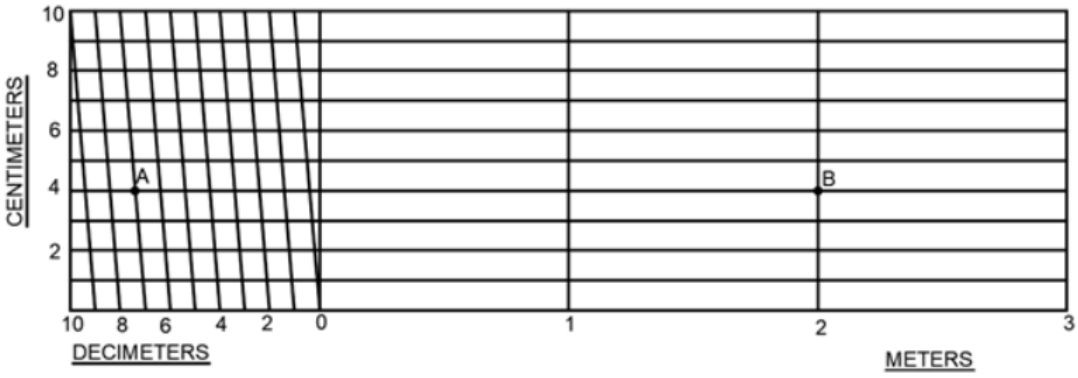
112. The ratio of the distance between any two points of the object on a drawing to the actual distance between the same points is known as

(A) Scaling fraction
(B) Scale factor
(C) Representative factor
(D) Representative fraction

113. A plane scale of 1:40 is used to measure upto 5 m. What is the length of the scale?

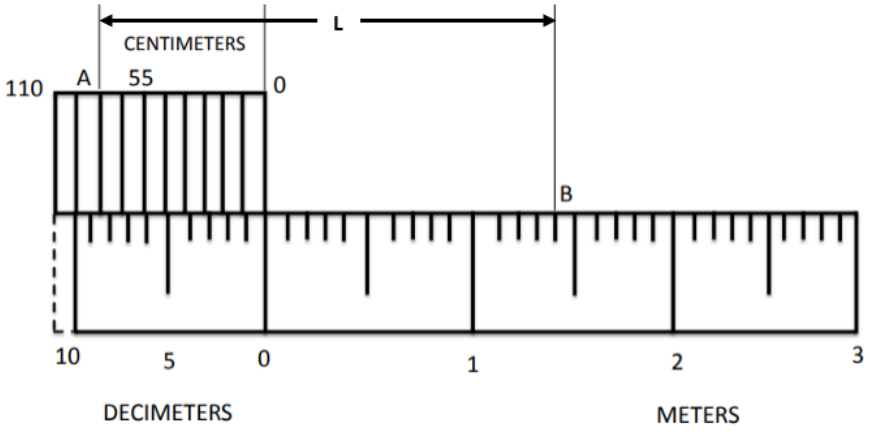
(A) 125 mm
(B) 100 mm
(C) 200 cm
(D) 5 m

114. What is the length of AB in the diagonal scale shown below?



(A) 4.72 m
(B) 2.74 m
(C) 2.74 cm
(D) 2.47 m

115. What is the length L in the vernier scale shown below?

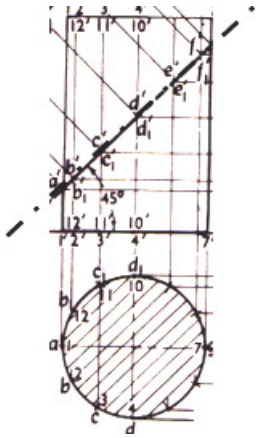


(A) 0.88 dm
(B) 1.4 m
(C) 1.488 cm
(D) 2.28 m

116. A cricket ball is thrown at an inclination of 450 to the ground. If the projection is from the ground and the ball falls on the ground at a distance of 80 m, what is the name of the curve traced by the ball?

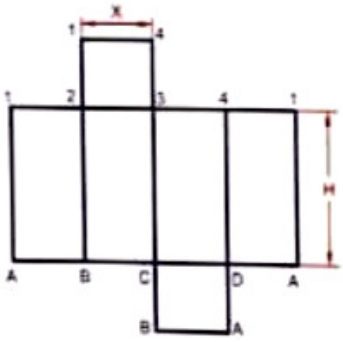
(A) Circular arc
(B) Elliptical arc
(C) Parabola
(D) Hyperbola

117. Cylinder is cut by a section plane as shown in the figure. What is the true shape of the section?



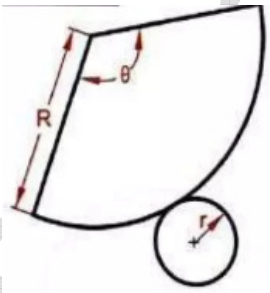
(A) Circle
(B) Ellipse
(C) Parabola
(D) Hyperbola

118. The development of a solid is shown below. Identify the solid.



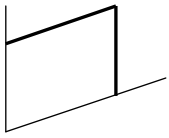
(A) Cube
(B) Square Pyramid
(C) Pentagonal Prism
(D) Square Prism

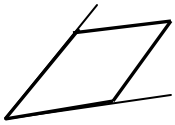
119. Identify the solid from the development of the surface shown below

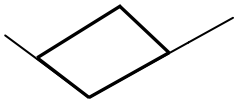


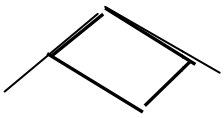
(A) Cylinder
(B) Cone
(C) Paraboloid
(D) Hyperboloid

120. The rectangle shown below represents the front view. What is the isometric view?

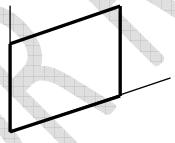
(A) 

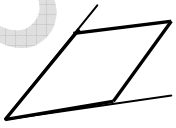
(B) 

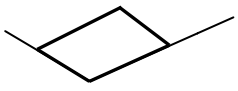
(C) 

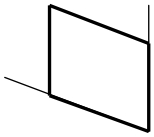
(D) 

121. The rectangle shown below represents the top view. What is the isometric view?

(A) 

(B) 

(C) 

(D) 

122. In perspective projection, the observer's eye is known as

(A) Picture point
(B) Station Point
(C) Ground point
(D) Horizon Point

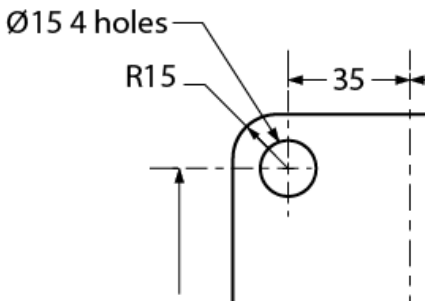
123. The imaginary lines drawn to join various corners of the object to the station point (SP) which pierce the picture plane are called

(A) Picture rays
(B) Perspective rays
(C) Visual rays
(D) Isometric rays

124. If an edge of the solid touches the picture plane, that edge will be seen in the perspective as

(A) enlarged
(B) reduced
(C) same length
(D) unable to predict

125. What is the dimension of the fillet radius in the following figure?



(A) 15 mm
(B) 154 mm
(C) 35 mm
(D) 77 mm

126. In Engineers scales, designation M5 indicates the scales

(A) 1 : 50
(B) 1: 100
(C) 1 : 150
(D) 1: 200

127. Why do we need engineering drawing standards?

(A) To eliminate the originality/creativity of drafter
(B) To have effective communication of drawings
(C) To modify and organize a way of drafting
(D) To eliminate mistakes and draw neatly

128. Which of the following statements is true as per the standard metric sizes of the drawing sheet?

(A) A_1 is double the A_0
(B) A_0 is double the A_1
(C) A_3 is half the A_0
(D) A_2 is half the A_3

129. In the manual drawing, which instrument is used to draw smooth curve passing through defined points?

(A) Drafter
(B) Compass
(C) French curve
(D) Drawing templates

130. Small bow compass can draw circles less than …… radius.

(A) 20 mm
(B) 25 mm
(C) 30 mm
(D) 35 mm

131. A map of 10 cm × 8 cm represents an area of 50000 square meter of a field. The R.F. of the scale is

(A) 1/25
(B) 1/625
(C) 1/2500
(D) 1/6250000

132. In orthographic projection the observer could stand ……. distance to look the object

(A) Infinite
(B) Finite
(C) at a given distance
(D) Decrement

133. Fourth angle projection is not used because

(A) Front view is above reference line and top view is below reference line
(B) Top view is above reference line and front view is below reference line
(C) Front view and top view both overlap on each other and below reference line
(D) Front view and top view both overlap on each other and above the reference line

134. Steps are given to draw a normal and a tangent to the ellipse at a point Q on it. Arrange the steps

(i) Draw a line ST through Q and perpendicular to NM
(ii) ST is the required tangent
(iii) Join Q with the foci F_1 and F_2
(iv) Draw a line NM bisecting the angle between the lines drawn before which is normal

(A) (i), (ii), (iii), (iv)
(B) (ii), (iv), (i), (iii)
(C) (iii), (iv), (i), (ii)
(D) (iv), (i), (ii), (iii)

135. …….. is a curve generated by a point on the circumference of a circle which rolls without slipping on a straight line?

(A) Trochoid
(B) Epicycloid
(C) Cycloid
(D) Evolute

136. If a line is inclined to Horizontal Plane and parallel to Vertical Plane, its plan will

(A) be perpendicular to XY line
(B) be parallel to XY line
(C) show the true length
(D) be inclined to XY line

137. A point in 4^{th} quadrant is 30 mm away from both the horizontal plane and vertical plane and orthographic projections are drawn. The distance between the points formed by front view and top view is

(A) 0
(B) 30 mm
(C) 15 mm
(D) 15 mm + distance from profile

138. A line which is parallel to horizontal plane and making an angle of 75 degrees with vertical has a length of 5 cm from top view. What is its true length?

(A) 4.82 cm
(B) 1.29 cm
(C) 19.31 cm
(D) 5 cm

139. A square is held 30 degrees with horizontal plane and turned 30 degrees with respect to vertical plane keeping earlier condition constant. The front view will be

(A) line
(B) square
(C) rectangle
(D) parallelogram

140. A pentagonal lamina is placed perpendicular to horizontal plane and inclined to profile plane. Which of the following is true?

(A) Front view-line, top view- pentagon
(B) Front view- pentagon, top view- line
(C) Front view –line, top view-line
(D) Top view-line, side view- line

141. Cone is generated by revolving …….., around one of its perpendicular sides which is kept fixed.

(A) Right-angled triangle
(B) Rectangle
(C) Square
(D) Half-rectangle

142. When a cone is cut by a plane parallel to its base, thus removing the top portion, the remaining portion is called

(A) Truncated
(B) Frustum
(C) Prism
(D) Irregular-prism

143. When the axis of solid is parallel to H.P &V.P, then …….view should be drawn first and …… and ……..view then projected from it

(A) front, top, side
(B) top, side, front
(C) side, front, top
(D) top, front, side

144. A square pyramid is placed such that its axis is inclined to V.P and one of its base edges is parallel to H.P. The top view will be

(A) Square
(B) Irregular pentagon
(C) Isosceles triangle
(D) Equilateral triangle

145. Which method is used for development of a sphere?

(A) Parallel - line development
(B) Radial - line development
(C) Triangulation development
(D) Approximate development

146. If the front view of a cone is represented by an equilateral triangle of 60 mm side. The area of its lateral surface is

(A) 120 π
(B) 1200 π
(C) 1800 π
(D) 3600 π

147. A cube is resting on H.P on one of its base such that base's diagonal is perpendicular to V.P. It is cut by a section plane making 45 degrees with V.P and perpendicular to H.P and also passing through the centre of the solid. The section in the front view will be a

(A) triangle
(B) rectangle
(C) trapezium
(D) parallelogram

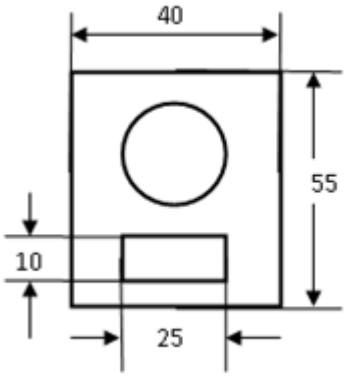
148. Which type of projection does not have the projection rays parallel to each other?

(A) Axonometric Projection
(B) Oblique Projection
(C) Orthographic Projection
(D) Perspective Projection

149. Lines of sights (projectors) for oblique projection will be

(A) Parallel to each other and perpendicular to projection plane
(B) Not parallel to each other and perpendicular to projection plane
(C) Parallel to each other and inclined to projection plane
(D) Not parallel to each other and inclined to projection plane

150. Which of the following dimension is according to the 'aligned system' of dimensioning?



(A) 40
(B) 55
(C) 25
(D) 10

BTECH LET – GENERAL ENGINEERING
(FINAL)

151. Which of the following instruments can be used to set a right angle in the field?

(A) Site Square
(B) Line Ranger
(C) Dumpy level
(D) None of the above

152. What is the particle size range of sand as per BIS code IS1498?

(A) > 4.75 mm
(B) 0.425 mm – 4.75 mm
(C) 0.075 mm – 0.425 mm
(D) 0.075 mm – 4.75 mm

153. Which of the following is not a classification of sand?

(i) Well graded
(ii) Poorly graded
(iii) Gap graded
(iv) Uniformly graded

(A) (i) and (ii)
(B) (i) and (iv)
(C) (i), (ii) and (iv)
(D) (i), (ii), (iii) and (iv)

154. As per BIS code IS1498, which of the following is the correct sequence of aggregates as per particle size?

(A) Boulder, Cobble, Coarse Gravel, Fine Gravel, Sand, Silt, Clay
(B) Cobble, Boulder, Coarse Gravel, Fine Gravel, Sand, Clay, Silt
(C) Boulder, Coarse Gravel, Fine Gravel, Cobble, Sand, Clay, Silt
(D) Cobble, Coarse Gravel, Boulder, Fine Gravel, Sand, Silt, Clay

155. The compound responsible for development of strength of cement during hydration is

(i) Dicalcium Silicate
(ii) Tricalcium Silicate
(iii) Tricalcium Aluminate
(iv) Tetracalcium Aluminoferrite

(A) (i) and (ii)
(B) (i) and (iii)
(C) (ii) and (iii)
(D) (ii) and (iv)

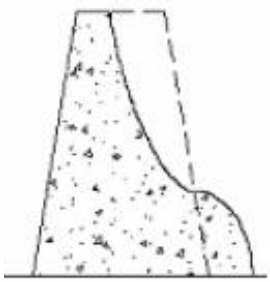
156. Which of the following is a typical characteristic of air entraining cement?

(A) Provides high resistance to sulphate attack
(B) Develops early strength
(C) Provides increased resistance to frost action
(D) Develops low heat of hydration

157. The expansion of cement should not exceed

(A) 5 mm
(B) 12 mm
(C) 10 mm
(D) 15 mm

158. Which of the following options correctly describes the figure with respect to testing of fresh concrete?



(A) True slump
(B) Shear slump
(C) Collapse slump
(D) None of the above

159. Which of the following tests can be used to determine the workability of concrete?

(i) Kelly ball test
(ii) UPV Test
(iii) Compacting factor
(iv) Vee bee consistometer
(v) Dutch Cone Test

(A) (i), (ii) and (iii)
(B) (i), (iii) and (iv)
(C) (iii), (iv) and (v)
(D) (i), (iii), (iv) and (v)

160. Which of the following is the correct sequence of operation of concrete manufacture?

(A) Batching-Mixing-Compacting-Transport-Placing-Curing-Finishing
(B) Batching-Mixing-Transport-Placing-Compacting-Finishing-Curing
(C) Batching-Mixing-Transport-Placing-Compacting-Curing-Finishing
(D) Batching-Compacting-Mixing-Transport-Placing-Finishing-Curing

161. Which of the following is a significant property of steam?

(A) Viscosity
(B) Density
(C) Enthalpy
(D) Specific gravity

162. Which type of heat exchanger is commonly used in steam power plants to transfer heat between steam and water?

(A) Shell and tube
(B) Plate
(C) Finned-tube
(D) Double pipe

163. The point at which a substance undergoes a phase transition from gas to liquid is referred as

(A) Boiling point
(B) Triple point
(C) Critical point
(D) Saturation point

164. For an ideal gas undergoing an isentropic process, what happens to the specific heat at constant pressure (Cp) compared to the specific heat at constant volume (Cv)?

(A) Cp >Cv
(B) Cp <Cv
(C) Cp = Cv
(D) The relationship depends on the specific gas

165. What is the term for transforming a solid to a vapour without passing through the liquid phase in thermodynamics?

(A) Sublimation
(B) Evaporation
(C) Condensation
(D) Fusion

166. What is the primary purpose of a diffuser in a gas turbine engine?

(A) Increase combustion efficiency
(B) Decelerate the incoming air
(C) Mix fuel with air
(D) Enhance exhaust velocity

167. Which type of engine has higher thermal efficiency?

A Carnot engine operating between the same temperature reservoirs or a Rankine engine.

(A) Carnot engine
(B) Rankine engine
(C) Both have the same efficiency
(D) It depends on specific conditions

168. In a Rankine cycle, what is the role of the condenser?

(A) Heat addition
(B) Heat rejection
(C) Isentropic compression
(D) Isentropic expansion

169. What does the term "entropy" represent?

(A) Thermal energy
(B) Disorder or randomness
(C) Heat capacity
(D) Internal energy

170. What is the primary advantage of a regenerative cycle in steam power plants?

(A) Reduced emissions
(B) Simplicity of design
(C) Lower cost
(D) Increased efficiency

171. When a inductive coil connected to a 200 V, 50 Hz AC supply with 10 A current flowing through it, dissipates 1000 Watts then which of the following will have least value in ohms?

(A) Resistance
(B) Reactance
(C) Impedance
(D) None of the above

172. How much current is produced by a voltage of 27 kV across a 15 kΩ resistance?

(A) 18 A
(B) 15 A
(C) 1.8 A
(D) 1.5 A

173. The electric field line and equipotential lines

(A) are parallel to each other
(B) are one and same
(C) cut each other orthogonally
(D) can be inclined to each other at any angle

174. Kirchhoff's law is applicable to

(A) Passive circuits only
(B) AC circuits only
(C) DC circuits only
(D) Both AC and DC circuits

175. What is the approximate filament resistance of a light bulb if it operates from a 220 V source with a current of 0.8 A flowing through it?

(A) 275 Ω
(B) 27.5 Ω
(C) 55 Ω
(D) 5.5 Ω

176. In a series resonance circuit at resonance, selectivity is equal to

(A) $\frac{1}{R\sqrt{LC}}$
(B) $\frac{1}{R}\sqrt{\frac{C}{L}}$
(C) $\frac{1}{R}\sqrt{\frac{L}{C}}$
(D) $\frac{1}{R}\sqrt{LC}$

177. The materials to be used in manufacture of a standard resistance should have

(A) High resistivity and low temperature coefficient
(B) Low resistivity
(C) High temperature
(D) None of the above

178. The deflection of a hot-wire instrument depends on

(A) RMS value of the Alternating Current
(B) RMS value of the AC voltage
(C) Average value of the AC current
(D) Average value of the AC voltage

179. Which one of the following meters is an integrating type of instrument?

(A) Ammeter
(B) Voltmeter
(C) Wattmeter
(D) Energy meter

180. How does a galvanometer become a voltmeter?

(A) By connecting a high resistance multiplier to the galvanometer in parallel
(B) By connecting a low resistance multiplier to the galvanometer in parallel
(C) A low resistance multiplier is connected in series with the galvanometer
(D) A high resistance multiplier is connected in series with the galvanometer

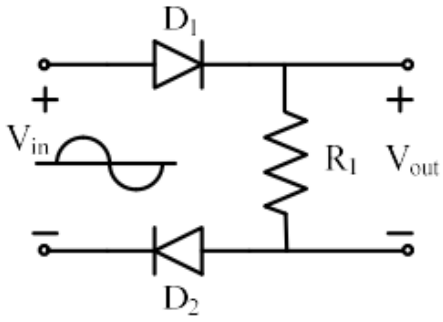
181. In order to get maximum undistorted output signal from CE amplifier with VCC= 10V, the value of VCE (Q) should be approximately

(A) 0.1V
(B) 5V
(C) 10V
(D) 16V

182. In comparison to full wave rectifier with two diodes the four divide bridge rectifier has the dominant advantage of

(A) Higher current carrying
(B) Lower ripple factor
(C) Higher efficiency
(D) Lower peak inverse voltage requirement

183. For the circuit shown below with ideal diodes, the output will be



(A) $V_{out} = V_{in}$ for $V_{in} > 0$
(B) $V_{out} = V_{in}$ for $V_{in} < 0$
(C) $V_{out} = -V_{in}$ for $V_{in} > 0$
(D) $V_{out} = -V_{in}$ for $V_{in} < 0$

184. Current flow in a semiconductor depends on phenomenon of

(A) Skin effect
(B) Semiconductor material
(C) Depletion region
(D) Charge carrier movement

185. What is the effect of capacitance on wattmeter reading?

(A) Opposite to that of resistance
(B) Aiding the capacitance
(C) Aiding the inductance
(D) Opposite to that of inductance

186. The power needs of electrical transducers is

(A) maximum
(B) minimum
(C) zero
(D) infinite

187. Bonded resistance wire strain gauge is of

(A) 7 types
(B) 5 types
(C) 3 types
(D) 9 types

188. …… conversion is the process of changing one of the characteristics of an analog signal based on the information in the digital data

(A) Analog-to-analog
(B) Digital-to-digital
(C) Digital-to-analog
(D) Analog-to-digital

189. Super hetero dyne receivers

(A) Have better sensitivity
(B) Have high selectivity
(C) Need extra circuitry for frequency conversion
(D) All of the above

190. Calculate the bandwidth occupied by a DSB signal when the modulating frequency lies in the range from 100 Hz to 10 kHz

(A) 28 kHz
(B) 24.5 kHz
(C) 38.6 kHz
(D) 19.8 kHz

191. What is the purpose of a compiler in programming?

(A) To convert high-level language to machine code
(B) To execute the program
(C) To debug the program
(D) To input data into the program

192. What is the purpose of the Random Access Memory (RAM)?

(A) Permanent storage of data
(B) Temporary storage of data for quick access
(C) Execution of program instructions
(D) Backup of files

193. Which of the following is an example of a wide-area network (WAN)?

(A) Home Wi-Fi network
(B) Ethernet network in an office building
(C) Internet
(D) Intranet

194. What protocol is commonly used for sending emails over the Internet?

(A) FTP (File Transfer Protocol)
(B) SMTP (Simple Mail Transfer Protocol)
(C) HTTP (Hypertext Transfer Protocol)
(D) TCP (Transmission Control Protocol)

195. What is the main function of a router in a computer network?

(A) Connects devices within the same LAN
(B) Connects devices within the same WAN
(C) Connects different networks and directs data between them
(D) Manages computer memory

196. What does DNS stand for in the context of computer networks?

(A) Digital Network Service
(B) Domain Name System
(C) Dynamic Network Server
(D) Data Naming Service

197. What is the purpose of a firewall in a computer network?

(A) Speed up data transmission
(B) Protect against unauthorized access
(C) Manage network resources
(D) Establish physical connections between devices

198. What is the correct syntax for declaring an integer variable in C?

(A) int x;
(B) x integer;
(C) declare x as integer;
(D) var x;

199. Which of the following is a logical operator in C?

(A) &&
(B) ++
(C) %
(D) --

200. In C, what is the purpose of the 'goto' statement?

(A) To create a loop
(B) To exit a function
(C) To transfer control to a labeled statement
(D) To skip the next statement

ANSWER KEY

Subject Name: 102 LATERAL ENTRY TO B TECH

SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key
1	B	31	C	61	C	91	A	121	C	151	A	181	B
2	C	32	A	62	D	92	B	122	B	152	D	182	D
3	A	33	C	63	C	93	A	123	C	153	D	183	A
4	C	34	C	64	C	94	B	124	C	154	A	184	D
5	C	35	D	65	D	95	B	125	A	155	A	185	D
6	D	36	D	66	D	96	A	126	D	156	C	186	B
7	B	37	C	67	B	97	C	127	B	157	C	187	C
8	B	38	A	68	B	98	C	128	B	158	B	188	C
9	C	39	D	69	A	99	B	129	C	159	B	189	D
10	B	40	B	70	B	100	C	130	B	160	C	190	D
11	B	41	A	71	D	101	D	131	D	161	C	191	A
12	B	42	B	72	B	102	B	132	A	162	A	192	B
13	D	43	A	73	C	103	B	133	C	163	C	193	C
14	D	44	A	74	A	104	C	134	C	164	A	194	B
15	B	45	D	75	C	105	B	135	C	165	A	195	C
16	B	46	C	76	A	106	B	136	B	166	B	196	B
17	C	47	B	77	A	107	C	137	A	167	A	197	B
18	A	48	D	78	C	108	D	138	D	168	B	198	A

19	D	49	A	79	B	109	C	139	D	169	B	199	A
20	A	50	C	80	C	110	A	140	B	170	D	200	C
21	A	51	C	81	C	111	B	141	A	171	A		
22	A	52	D	82	B	112	D	142	B	172	C		
23	A	53	A	83	B	113	A	143	C	173	C		
24	D	54	C	84	C	114	B	144	C	174	D		
25	A	55	B	85	C	115	D	145	D	175	A		
26	D	56	D	86	B	116	C	146	C	176	C		
27	C	57	B	87	C	117	B	147	B	177	A		
28	C	58	D	88	B	118	D	148	D	178	A		
29	A	59	B	89	B	119	B	149	C	179	D		
30	D	60	A	90	A	120	A	150	A	180	D		