

CUSAT 2023
B TECH LET
(RESERVE) (FINAL)

1. Fill in the Blanks with suitable answers from the choice given below

Since they could not the management's decision, they decided to go on strike

- (A) assume
- (B) adhere
- (C) accept
- (D) stick

2. Fill in the Blanks with suitable answers from the choice given below

The University an honorary doctorate award on the veteran actor for his contribution to the field of cinema.

- (A) retrieved
- (B) conferred
- (C) salvaged
- (D) exchanged

3. Select the correct form of **Active Voice** for the following

Many miracles have been shown by God

- (A) God shows many miracles
- (B) God has shown many miracles
- (C) God will show many miracles
- (D) God showed many miracles

4. Select the correct form of **Active Voice** for the following

A meeting had been organised by people to congratulate him on his success

- (A) People organised a meeting to congratulate him on his success
- (B) People have organised a meeting to congratulate him on his success
- (C) People had organised a meeting to congratulate him on his success
- (D) People organise a meeting to congratulate him on his success

5. Choose the correct form of **Passive Voice** for the following

In our village the girls outnumbered the boys by about two to one

- (A) In our village the girls had been outnumbered by the boys by about two to one
- (B) In our village the boys had been outnumbered by the girls by about two to one
- (C) In our village the boys were outnumbered by the girls by about two to one
- (D) In our village the boys have been outnumbered by the girls by about two to one

6. Choose the correct form of **Passive Voice** for the following

My neighbour feels excited when his son visits him

- (A) My neighbour feels excited when he was visited by his son
- (B) My neighbour feels excited when he is visited by his son
- (C) My neighbour feels excited when he will be visited by his son
- (D) My neighbour feels excited when he has been visited by his son

7. Choose the correct form of **Passive Voice** for the following

They have known him for a long time

- (A) He was known by them for a long time
- (B) He may be known by them for a long time
- (C) He has been known by them for a long time
- (D) He is known by them for a long time

8. Choose the correct form of **Passive Voice** for the following

Where did you keep your purse?

- (A) Where was your purse kept by you?
- (B) Where had been your purse kept by you?
- (C) Where is your purse kept by you?
- (D) Where could be your purse kept by you?

9. Choose the correct form of **Passive Voice** for the following

She is singing a song to refresh her mind

- (A) A song is sung by her to refresh her mind
- (B) A song was sung by her to refresh her mind
- (C) A song is being sung by her to refresh her mind
- (D) A song would be sung by her to refresh her mind

10. Choose the correct **Synonym** for the following

ASPIRATION

- (A) Ambition
- (B) Dislike
- (C) Pride
- (D) Dream

11. Choose the correct **Synonym** for the following

DESOLATE

- (A) Decent
- (B) Disgusting
- (C) Abandoned
- (D) Ugly

12. Select the correct **One Word Substitute** for the following

Spend less than before

- (A) Economize
- (B) Inflate
- (C) Expend
- (D) Spare

13. Select the correct **One Word Substitute** for the following

Fond of enquiring into other people's affairs

- (A) Watchful
- (B) Peeping
- (C) Mindful
- (D) Inquiring

14. Fill in the Blanks with suitable answers from the choice given below

Is there an effective remedy this problem?

- (A) in
- (B) at
- (C) for
- (D) with

15. Fill in the Blanks with suitable answers from the choice given below

This film will give you a thrill joy

- (A) in
- (B) of
- (C) at
- (D) with

16. Choose the sentence with the correct word order from the following

- (A) Twelve rupees now is the minimum bus fare
- (B) The minimum bus fare is twelve rupees now
- (C) The bus fare minimum is twelve rupees now
- (D) Now minimum is twelve rupees the bus fare

17. Choose the correct sentence from the following

- (A) I had passed B.A. degree examination in 2010
- (B) I passed B.A. degree examination in 2010
- (C) I have passed B.A. degree examination in 2010
- (D) I did pass B.A. degree examination in 2010

18. Choose the correct sentence from the following

- (A) I have not seen him about several days
- (B) I have not seen him for several days
- (C) I have not seen him during several days
- (D) I have not seen him of several days

19. Choose the correct sentence from the following

- (A) Much water has flown to the canal
- (B) Much water has flowed to the canal
- (C) Much water flew to the canal
- (D) Much water is flown to the canal

20. Choose the correct sentence from the following

- (A) Riya has stayed in London from 1999
- (B) Riya has been staying in London since 1999
- (C) Riya is staying in London since 1999
- (D) Riya was staying in London since 1999

21. The angle between two unit-magnitude co-planar vectors $U(0.866, 0.500, 0)$ and $V(0.259, 0.966, 0)$ is

- (A) 45°
- (B) 60°
- (C) 0°
- (D) 30°

22. For the orthogonal matrix $B = \begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -1 \\ 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & -1 \end{pmatrix}$, $[BB^T]^{-1} =$

(A) $\begin{pmatrix} \frac{1}{4} & 0 & 0 & 0 \\ 0 & \frac{1}{4} & 0 & 0 \\ 0 & 0 & \frac{1}{4} & 0 \\ 0 & 0 & 0 & \frac{1}{4} \end{pmatrix}$

(B) $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

(C) $\begin{pmatrix} \frac{1}{2} & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 \\ 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & \frac{1}{2} \end{pmatrix}$

(D) $\begin{pmatrix} \frac{1}{4} & 0 & 0 & 0 \\ 0 & \frac{1}{4} & 0 & 0 \\ 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & \frac{1}{2} \end{pmatrix}$

23. The value of the integral $\int_0^{\infty} \int_0^{\infty} e^{-x^2} e^{-y^2} dx dy$ is

- (A) π
- (B) $\sqrt{\pi}$
- (C) $\frac{\pi}{4}$
- (D) $\sqrt{\frac{\pi}{2}}$

24. The roots of the polynomial $p(y) = y^5 + y + 2$ are

- (A) non-real complex numbers
- (B) real numbers only
- (C) three real and two complex numbers
- (D) one real and four complex numbers

25. The probability of two friends sharing the same birth - month is

- (A) $\frac{1}{144}$
- (B) $\frac{1}{6}$
- (C) $\frac{1}{12}$
- (D) $\frac{1}{24}$

26. Which one of the following functions is strictly bounded?

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

27. Which of the following functions is even?

(A) $f(x) = \log_2(x + \sqrt{x^2 + 1})$

(B) $f(x) = \frac{a^x + 1}{a^x - 1}$

(C) $f(x) = x \frac{a^x - 1}{a^x + 1}$

(D) $f(x) = \frac{a^x + a^{-x}}{a^x - a^{-x}}$

28. The function $g(x) = \left(\frac{x^2}{3}\right) - x$ attains the minimum value at

(A) $x = -1$

(B) $x = 1$

(C) $x = \frac{1}{\sqrt{3}}$

(D) $x = 0$

29. A box has 3 red balls and 5 blue balls. A total of three balls are picked from the box one after another, without replacing them back. The probability of getting two blue balls and one red ball is

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

(B) $\frac{2}{15}$

(C) $\frac{3}{8}$

(D) $\frac{15}{28}$

30. Two lines with direction ratios 1, 2, 5 and $-2, 1, 0$ are

(A) parallel

(B) perpendicular

(C) not perpendicular

(D) same

31. For what values of a and b , the following simultaneous equations have an infinite number of solutions?

$$x + y + z = 5; \quad x + 3y + 3z = 6; \quad x + 2y + az = b.$$

- (A) $a = 7, b = 2$
- (B) $a = 8, b = 3$
- (C) $a = 3, b = 8$
- (D) $a = 2, b = 7$

32. Consider the continuous random variable with probability density function

$$f(t) = 1+t \quad \text{for } -1 \leq t \leq 0 \\ = 1-t \quad \text{for } 0 \leq t \leq 1$$

The standard deviation of the random variable is

- (A) $\frac{1}{\sqrt{6}}$
- (B) $\frac{1}{3}$
- (C) $\frac{1}{6}$
- (D) $\frac{1}{\sqrt{3}}$

33. The value of $\tan\left(\frac{1}{4} \sin^{-1} \frac{\sqrt{63}}{8}\right)$ is

- (A) $\frac{1}{\sqrt{5}}$
- (B) $\frac{2}{\sqrt{3}}$
- (C) $\frac{1}{\sqrt{7}}$
- (D) $\frac{2}{\sqrt{7}}$

34. The sum of two numbers is equal to sum of square of 11 and cube of 9. The largest number is 5^2 less than square of 25. What is the value of the sum of twice of 24 percent of the smaller number and half of the larger number?
- (A) 435
(B) 420
(C) 410
(D) 400
35. $\lim_{x \rightarrow 0} \frac{4^x - 1}{3^x - 1}$ equals
- (A) $\log_3 4$
(B) $\log_4 3$
(C) $\log_e 4$
(D) 1
36. The rank of the matrix $\begin{pmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$ is
- (A) 0
(B) 1
(C) 2
(D) 3
37. If one root of the equation $x^3 - 10x^2 + 31x - 30 = 0$ is 5, the other two roots are
- (A) 2, 3
(B) 2, 4
(C) 3, 4
(D) -2, -3
38. The expression $e^{-\log x}$ for $x > 0$ is equal to
- (A) x
(B) $-x$
(C) x^{-1}
(D) $-x^{-1}$

39. Let $g(x)$ be a polynomial of degree 2 satisfying $g(0) = 1$, $g'(0) = -2$ and $g''(0) = 6$.

Then $\int_{-1}^2 g(x) dx$ is equal to

- (A) 6
- (B) 9
- (C) 0
- (D) -9

40. The equation of the hyperbola whose asymptotes are $3x \pm 5y = 0$ and vertices are $(\pm 5, 0)$ is

- (A) $3x^2 - 5y^2 = 25$
- (B) $5x^2 - 3y^2 = 25$
- (C) $9x^2 - 25y^2 = 225$
- (D) $25x^2 - 9y^2 = 225$

41. The total number of proper factors of 7875 is

- (A) 20
- (B) 21
- (C) 22
- (D) 23

42. The normals at the ends of the latus rectum of the parabola $y^2 = 4ax$ intersect at angle of

- (A) $\frac{\pi}{2}$
- (B) $\frac{\pi}{3}$
- (C) $\frac{\pi}{4}$
- (D) $\frac{\pi}{6}$

43. Let I denote the 3×3 identity matrix and M be a matrix obtained by rearranging the columns of I . Then
- (A) there are six distinct choices for M and $\det(M) = 1$
 - (B) there are more than one choices for M and some of them are not invertible
 - (C) there are six distinct choices for M and $\det(M) = \pm 1$
 - (D) there are more than one choices for M and $M^{-1} = I$ in each choice
44. A fair dice is rolled twice. The probability that an odd number will follow an even number is
- (A) $\frac{1}{2}$
 - (B) $\frac{1}{3}$
 - (C) $\frac{1}{4}$
 - (D) $\frac{1}{6}$
45. Which of the following statements is not true?
- (A) In a positively skewed distribution, mean $>$ median $>$ mode
 - (B) In a negatively skewed distribution, mode $>$ mean $>$ median
 - (C) The measure of skewness is dependent upon the amount of dispersion
 - (D) In a symmetric distribution, the values of mean, mode and median are the same
46. If \vec{i} , \vec{j} , \vec{k} are the unit vectors and mutually perpendicular, then $[\vec{i} - \vec{j} \quad \vec{j} - \vec{k} \quad \vec{k} - \vec{i}]$ is
- (A) 0
 - (B) 1
 - (C) -1
 - (D) 2
47. If $b = a + \sqrt{a + \sqrt{a + \sqrt{a + \sqrt{a + \dots \infty}}}}$, then $b(2)$ is
- (A) 2 only
 - (B) 4 only
 - (C) 1 only
 - (D) undefined

48. The number of linearly independent eigen vectors of $\begin{pmatrix} 2 & 1 \\ 0 & 2 \end{pmatrix}$ is

- (A) 0
- (B) 1
- (C) 2
- (D) infinite

49. Which of the following integrals is unbounded?

- (A) $\int_0^{\frac{\pi}{4}} \tan x \, dx$
- (B) $\int_0^{\infty} \frac{1}{x^2 + 1} \, dx$
- (C) $\int_0^{\infty} x e^{-x} \, dx$
- (D) $\int_0^{\infty} \frac{1}{1-x} \, dx$

50. If $(\vec{i} + \vec{j} - \vec{k}) \times (3\vec{i} + p\vec{j} + q\vec{k}) = \vec{0}$, then the values of p and q are respectively

- (A) $p = 3, q = -3$
- (B) $p = -3, q = 3$
- (C) $p = 1, q = -3$
- (D) $p = \frac{1}{3}, q = \frac{-1}{3}$

51. The distance x metres described by a van in time t seconds is given by $4t^3 - 2t^2 + 3t - 2$. The velocity (v) and acceleration (a) when $t = 2s$ are respectively equal to

- (A) $v = 43 \text{ m/s}, a = 44 \text{ m/s}^2$
- (B) $v = 44 \text{ m/s}, a = 43 \text{ m/s}^2$
- (C) $v = 43 \text{ m/s}^2, a = 43 \text{ m/s}$
- (D) $v = 44 \text{ m/s}^2, a = 43 \text{ m/s}$

52. An examination consists of two papers, mathematics and science. The probability of failing in mathematics is 0.3 and that in science is 0.2. Given that a student has failed in science, the probability of failing in mathematics is 0.6. The probability of a student failing in both the papers is
- (A) 0.5
 - (B) 0.06
 - (C) 0.12
 - (D) 0.18
53. If the standard deviation of the spot speed of vehicles in a highway is 8.8 kmph and the mean speed of the vehicles is 33 kmph, the coefficient of variation in speed is
- (A) 0.3645
 - (B) 0.2666
 - (C) 0.1867
 - (D) 0.1517
54. The set of all $x \in \mathbb{R}$ for which the vectors $(1, x, 0)$, $(0, x^2, 1)$ and $(0, 1, x)$ are linearly independent in \mathbb{R}^3 is
- (A) $\{x \in \mathbb{R} : x = 0\}$
 - (B) $\{x \in \mathbb{R} : x \neq 0\}$
 - (C) $\{x \in \mathbb{R} : x \neq 1\}$
 - (D) $\{x \in \mathbb{R} : x \neq -1\}$
55. The length of the curve $y = \frac{2}{3}x^{3/2}$ between $x = 0$ and $x = 1$ is
- (A) 0.27
 - (B) 1.22
 - (C) 1
 - (D) 0.67
56. The value of $\int_0^3 \int_0^x (6 - x - y) dx dy$ is
- (A) 13.5
 - (B) 27
 - (C) 40.5
 - (D) 54

57. The residue of the function $f(z) = \frac{1}{(z+2)^2(z-2)^2}$ at $z = 2$ is

(A) $\frac{1}{32}$

(B) $\frac{1}{16}$

(C) $\frac{-1}{16}$

(D) $\frac{-1}{32}$

58. A single die is thrown twice. The probability that the sum is neither 8 nor 9 is

(A) $\frac{1}{9}$

(B) $\frac{5}{36}$

(C) $\frac{1}{4}$

(D) $\frac{3}{4}$

59. Let A, B, C, D be $n \times n$ matrices, each with non-zero determinant. If $ABCD = I$, then B^{-1} is

(A) $D^{-1}C^{-1}A^{-1}$

(B) ADC

(C) CDA

(D) CAD

60. A probability density function is of the form $p(x) = ke^{-\alpha|x|}$, $x \in \mathbb{R}$. Then the value of k is

(A) 1

(B) 0.5

(C) α

(D) 0.5α

61. If $\phi(x) = \int_0^{x^2} \sqrt{t} dt$, then $\frac{d\phi}{dx} =$

- (A) 0
- (B) 1
- (C) $2x^2$
- (D) \sqrt{x}

62. Let $x+8y-22=0$, $5x+2y-34=0$, $2x-3y+13=0$ be the three sides of a triangle. Then the area of the triangle is

- (A) 36 square unit
- (B) 42 square unit
- (C) 19 square unit
- (D) 72 square unit

63. If 3 arithmetic means, 3 geometric means and 3 harmonic means are inserted between 1 and 5, then the cubic equation whose roots are first A.M, second G.M, and third H.M, between 1 and 5 is

- (A) $x^3 - \left(\frac{9}{2} + \sqrt{5}\right)x^2 + \left(\frac{9\sqrt{5}}{2} + 5\right)x - 5\sqrt{5} = 0$
- (B) $x^3 + \left(\frac{9}{2} + \sqrt{5}\right)x^2 - \left(\frac{9\sqrt{5}}{2} + 5\right)x - 5\sqrt{5} = 0$
- (C) $x^3 + \left(\frac{9}{2} - \sqrt{5}\right)x^2 - \left(\frac{9\sqrt{5}}{2} - 5\right)x + 5\sqrt{5} = 0$
- (D) $x^3 - \left(\frac{9}{2} - \sqrt{5}\right)x^2 + \left(\frac{9\sqrt{5}}{2} - 5\right)x - 5\sqrt{5} = 0$

64. Let X be a uniformly distributed random variable that takes values between 0 and 1. Then the value of $E(X^3)$ is

(A) 0

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

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

(D) $\frac{1}{8}$

65. For which values of X and Y , $\sin X = \cot Y$ holds?

(A) $X = Y = 0$

(B) $X = Y = \frac{\pi}{2}$

(C) $X = 0, Y = \frac{\pi}{2}$

(D) $X = \frac{\pi}{2}, Y = 0$

66. The total number of subsets of a finite set E has 56 more elements than the total number of subsets of another finite set F . Then the number of elements in the set E is

(A) 4

(B) 5

(C) 6

(D) 7

67. Let $X = \begin{pmatrix} 0 & \tan \frac{\theta}{2} \\ -\tan \frac{\theta}{2} & 0 \end{pmatrix}$ and $(I + X)(I - X)^{-1} = \begin{pmatrix} a & -b \\ b & a \end{pmatrix}$. Then the value of

$13(a^2 + b^2)$ is

(A) 0

(B) 13

(C) 26

(D) 39

68. The value of the integral of the function $g(x, y) = 4x^3 + 10y^4$ along the straight line segment from the point $(0, 0)$ to the point $(1, 2)$ in the $X - Y$ plane is
- (A) 38
 - (B) 36
 - (C) 33
 - (D) 30
69. The general solution of the differential equation $\frac{dy}{dx} = e^{x+y}$ is
- (A) $e^{x+y} + C$
 - (B) $e^x - e^y = C$
 - (C) $\frac{e^{x+y}}{x+y} = C$
 - (D) $-e^{-y} = e^x + C$
70. What is the domain of convexity of the function $f(x) = e^x$?
- (A) concave downward
 - (B) concave upward in $(-\infty, 0)$ and $(0, \infty)$
 - (C) everywhere convex downward
 - (D) convex downward in $(-\infty, 0)$
71. The Lami's theorem is applicable only for
- (A) Coplanar forces
 - (B) Concurrent forces
 - (C) Coplanar and concurrent forces
 - (D) Any type of forces
72. Two tensile forces, each of magnitude F are acting on a point perpendicular to each other, the resultant force will be
- (A) Zero
 - (B) \sqrt{F}
 - (C) $\sqrt{(2F)}$
 - (D) $\sqrt{2} \cdot (F)$

73. The greatest and least resultants of two forces F_1 and F_2 are 17 N and 3 N respectively. The angle between them is when their resultant is $\sqrt{149}$ N
- (A) 45°
 - (B) 30°
 - (C) 60°
 - (D) 90°
74. A couple consists of
- (A) Two like parallel forces of same magnitude
 - (B) Two like parallel forces of different magnitude
 - (C) Two unlike parallel forces of same magnitude
 - (D) Two unlike parallel forces of different magnitude
75. Which of the following is an example of a couple?
- (A) Turning the cap of ink bottle
 - (B) Twisting a screw driver
 - (C) Steering a car
 - (D) All of the above
76. The centroid of a semicircle lies at a distance of from its base measured along the vertical radius R
- (A) $3R/4\pi$
 - (B) $4R/3\pi$
 - (C) $4\pi/3R$
 - (D) $3\pi/4R$
77. All dimensions of a plain area are measured in metre, then the unit of moment of inertia of the section is
- (A) m^2
 - (B) m^3
 - (C) m^4
 - (D) m^6

78. The moment of inertia of a triangular section of base b and height h about its axis passing through its vertex and parallel to its base is as that passing through the centre of gravity and parallel to base
- (A) 4 times
 - (B) 6 times
 - (C) 9 times
 - (D) 12 times
79. The angle of friction on a body which is about to slide down by its own weight will be
- (A) Zero
 - (B) Equal to angle of inclination
 - (C) At a right angle
 - (D) None of the above
80. The coefficient of friction is the ratio of
- (A) Limiting friction to the normal reaction
 - (B) Limiting friction to the weight of the body to be moved
 - (C) Sliding friction to the normal reaction
 - (D) None of the above
81. Two bodies A and B are projected upwards such that the velocity of A is double the velocity of B , then the height to which body A will rise will be the height to which body B will rise
- (A) 2 times
 - (B) 4 times
 - (C) 6 times
 - (D) 8 times
82. The linear displacement of a moving particle with respect to time is given by $S = (t^3 - 6t^2 + 3t + 4)$ m. The velocity of the particle when acceleration is zero is
- (A) 3 m/s
 - (B) -9m/s
 - (C) 48 m/s
 - (D) -12 m/s

83. The acceleration of a moving particle starting from rest varies with time as $a = kt + C$, then the velocity of particle at time t is given by
- (A) $kt^2 + Ct$
 - (B) $0.5kt^2 + Ct$
 - (C) $kt^2 + Ct/2$
 - (D) $0.5(kt^2 + Ct)$
84. A particle moves 3 m towards East and 4 m towards North, then displacement of the particle will be
- (A) 7 m
 - (B) 10 m
 - (C) 2 m
 - (D) 5 m
85. A particle starts with an initial velocity u and moving with acceleration a and reaches velocity v in time t , then the relation is given by
- (A) $v = u + at$
 - (B) $v = u - at$
 - (C) $v = ut + a$
 - (D) $v = ua + t$
86. Time to reach the maximum height of a body projected vertically up is
- (A) $2u/g$
 - (B) u/g
 - (C) $u^2/2g$
 - (D) ug
87. A cyclist riding with a speed of 20 kmph takes a turn round a circular road of radius 10 m. What is the inclination of the road?
- (A) 18.2°
 - (B) 15.4°
 - (C) 17.47°
 - (D) 20°

88. When a vehicle is moving along a circular path, the centrifugal force tends to overturn the vehicle. The chances of overturning can be decreased by
- (A) Decreasing the speed of the vehicle
 - (B) Increasing the speed of the vehicle
 - (C) Increasing the height of centre of gravity of the vehicle from the road level
 - (D) Reducing the frictional resistance between the road and tyre
89. The horizontal range of a projectile is maximum when the angle of projection is
- (A) 75°
 - (B) 60°
 - (C) 45°
 - (D) 30°
90. The maximum displacement of a body moving with simple harmonic motion from its mean position is called
- (A) Beat
 - (B) Oscillation
 - (C) Amplitude
 - (D) None of the above
91. The equation $\frac{d^2x}{dt^2} + \omega^2 x = 0$ represents
- (A) Linear motion
 - (B) Angular motion
 - (C) Linear motion with variable acceleration
 - (D) Simple harmonic motion
92. The coefficient of restitution for inelastic bodies is
- (A) One
 - (B) Zero
 - (C) Between 0 and 1
 - (D) None of the above
93. A body is acted upon by the following sets of three concurrent forces. Which set cannot have a zero resultant?
- (A) 10, 10 and 10 units
 - (B) 10, 10 and 20 units
 - (C) 10, 20 and 20 units
 - (D) 10, 20 and 40 units

94. A mass of 1 kg is attached to the middle of a rope, which is being pulled from both ends in the opposite directions. Taking $g = 10 \text{ m/s}^2$, the minimum pull required to completely straighten the rope is
- (A) 5 N
 - (B) 10 N
 - (C) 25 N
 - (D) Infinity
95. A particle moving along a straight line path with uniform retardation crosses a fixed point and the stop watch is started. The particle is seen to travel 180 cm in first 3 seconds and 220 cm in the next 5 seconds. The velocity of the particle at the end of 9 seconds would be
- (A) 20 cm/s
 - (B) 30 cm/s
 - (C) 36 cm/s
 - (D) 45 cm/s
96. A vector of magnitude 10 units and direction 30 degrees North of East can be expressed analytically as
- (A) $8.66i + 5j$
 - (B) $5i + 8.66j$
 - (C) $5.77i + 8.17j$
 - (D) $7.01i + 7.01j$
97. The kinetic energy of a body is stated to increase by 300 percent. The corresponding increase in momentum of the body will be
- (A) 50%
 - (B) 100%
 - (C) 200%
 - (D) 300%
98. Two projectiles are fired with equal velocities but one with angle 30° and the other at 60° with horizontal. Then
- (A) Both will have same horizontal range
 - (B) Both will rise to the same maximum height
 - (C) Both will have same horizontal range as well as same maximum height
 - (D) Both will have same time of flight

99. Which one of the following does not conform to simple harmonic motion?

- (A) Motion followed by depressing and release of liquid in U tube
- (B) Motion of earth and other planets around the sun
- (C) Motion of balance wheel of a watch
- (D) Motion of the bob of a simple pendulum

100. The time period of a simple harmonic motion is given by

$$T = 2\pi \cdot (\text{displacement/acceleration})^{0.5}$$

If the displacement increases, the time period would

- (A) Increase
- (B) Decrease
- (C) Remains unchanged
- (D) Increase or decrease depending upon speed of the particle

101. A rotating body needs a torque of 2×10^{-4} Nm to acquire an angular acceleration of 4 rad/s^2 . The moment of inertia of the body is

- (A) $0.25 \times 10^{-4} \text{ kg.m}^2$
- (B) $0.5 \times 10^{-4} \text{ kg.m}^2$
- (C) $0.75 \times 10^{-4} \text{ kg.m}^2$
- (D) $1.0 \times 10^{-4} \text{ kg.m}^2$

102. A flywheel rotates about a fixed axis and slows down from $600 \pi \text{ rad/min}$ to $200 \pi \text{ rad/min}$ in 2 minutes time duration. The angular acceleration in rad/min^2 during the slowdown is

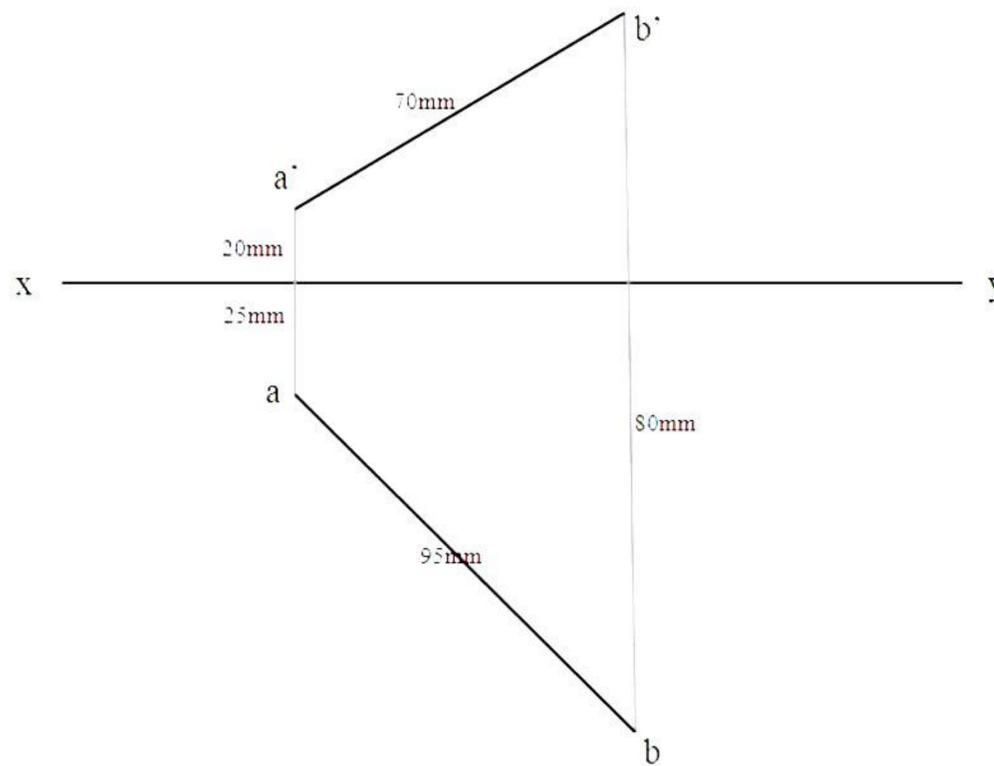
- (A) 100π
- (B) 150π
- (C) 200π
- (D) 600π

103. If the earth were to suddenly contract to $1/n^{\text{th}}$ of its present volume without any change in its mass, then duration of its new day will be
- (A) $24/n$ hours
 - (B) $24 \sqrt{n}$ hours
 - (C) $24/n^2$ hours
 - (D) $24 n^{2/3}$ hours
104. The ratio of escape velocity on earth's surface and its orbital velocity is equal to
- (A) $\frac{1}{2}$
 - (B) $\sqrt{2}$
 - (C) $2^{1/3}$
 - (D) 2
105. A satellite launch station should be
- (A) near the pole region
 - (B) on the pole axis
 - (C) near the equatorial region
 - (D) All above locations are equally suitable
106. Two similar balls are allowed to fall from different heights h_1 and h_2 . The ratio of their linear momenta at half of their heights will be
- (A) $\sqrt{(h_1/h_2)}$
 - (B) h_1/h_2
 - (C) $(h_1/h_2)^2$
 - (D) 1 : 1
107. The tension in the cable supporting a lift moving upwards is twice the tension when the lift moves downwards. The acceleration of the lift is equal to
- (A) g
 - (B) $g/2$
 - (C) $g/3$
 - (D) $g/4$

108. Forces are called concurrent when their lines of action meet at
- (A) One point
 - (B) Two points
 - (C) Plane
 - (D) Perpendicular plane
109. Which of the following do not have identical dimensions?
- (A) Momentum and impulse
 - (B) Torque and energy
 - (C) Torque and work
 - (D) Moment of a force and angular momentum
110. The period of oscillation of a simple pendulum depends on
- (A) mass of bob
 - (B) radius of bob
 - (C) density of bob
 - (D) its effective length
111. How many lines of known inclinations can be drawn around a point using a scale and two set squares?
- (A) 4
 - (B) 16
 - (C) 8
 - (D) 24
112. Continuous thick lines are used to represent
- (A) Dimension lines
 - (B) Visible outlines
 - (C) Projection lines
 - (D) Hidden edges
113. Hatching lines (section lines) are preferably drawn at
- (A) 45° to the line of symmetry of section
 - (B) 60° to the line of symmetry of section
 - (C) 30° to the axis of the solid
 - (D) 60° to the axis of the solid

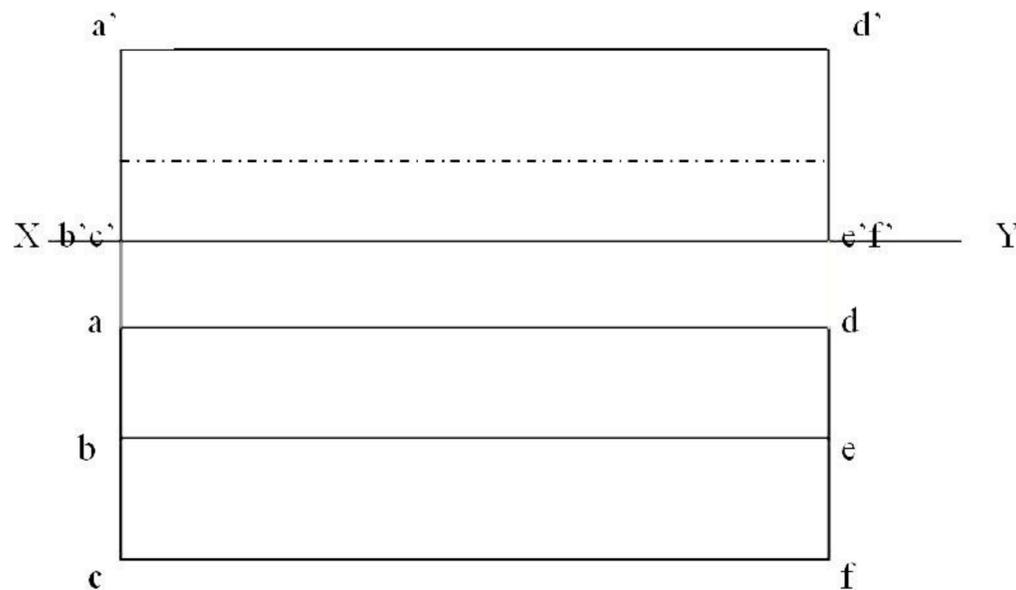
114. A line is perpendicular to HP. What is its top view?
- (A) A line parallel to XY line
 - (B) A line of shorter in length perpendicular to XY line
 - (C) A line of true length perpendicular to XY line
 - (D) A point
115. A line 100 mm long makes 20° to HP and 60° to VP. What is the length of its top view?
- (A) 20 mm
 - (B) 94 mm
 - (C) 60 mm
 - (D) 50 mm
116. When the end projectors of a line inclined to both HP and VP coincide, the line lies in
- (A) HP
 - (B) VP
 - (C) the joint between HP and VP
 - (D) a plane perpendicular to both HP and VP
117. If the top view and front view of a point K coincide and is below XY line, the point K is in
- (A) Third quadrant
 - (B) Second quadrant
 - (C) First quadrant
 - (D) Fourth quadrant
118. If the traces of a line coincide, which statement is true?
- (A) The line makes same inclinations with HP and VP
 - (B) All points on the line are equidistant from HP and VP
 - (C) The line is lying on HP
 - (D) The extensions of the line meet the joint between HP and VP
119. End A of a line AB is 30 mm above HP and 40 mm in front of VP. End B is 60 mm below HP and 40 mm in front of VP. The projectors of A and B are 60 mm apart. What is the approximate true length of line AB?
- (A) 90 mm
 - (B) 100 mm
 - (C) 108 mm
 - (D) 120 mm

120. End A of a line AB is 30 mm above HP and 30 mm behind VP. End B is 30 mm above HP and 50 mm in front of VP. The projectors of A and B are 60 mm apart. Where is its horizontal trace?
- (A) 30 mm in front of VP
 (B) 50 mm in front of VP
 (C) 60 mm below HP
 (D) No horizontal trace
121. The projections of a line AB are given here (not to scale). Which statement about the line is wrong?



- (A) Line AB is in first quadrant and is inclined to both planes
 (B) End B is nearer to VP than end A
 (C) True length of line AB is more than 95 mm
 (D) (inclination to HP + inclination to VP) < 90°
122. A cube is resting on HP on an edge which is parallel to VP. Which statement is true?
- (A) Front view is a square
 (B) Top view is a square
 (C) Side view is a square
 (D) None of the above
123. A cube is suspended on a string fixed at a corner. Which statement is true?
- (A) All edges make same inclination to HP
 (B) All edges make same inclination to VP
 (C) 4 edges are parallel to VP
 (D) 4 edges are parallel to HP

124. Which statement is most suited with reference to the given figure?

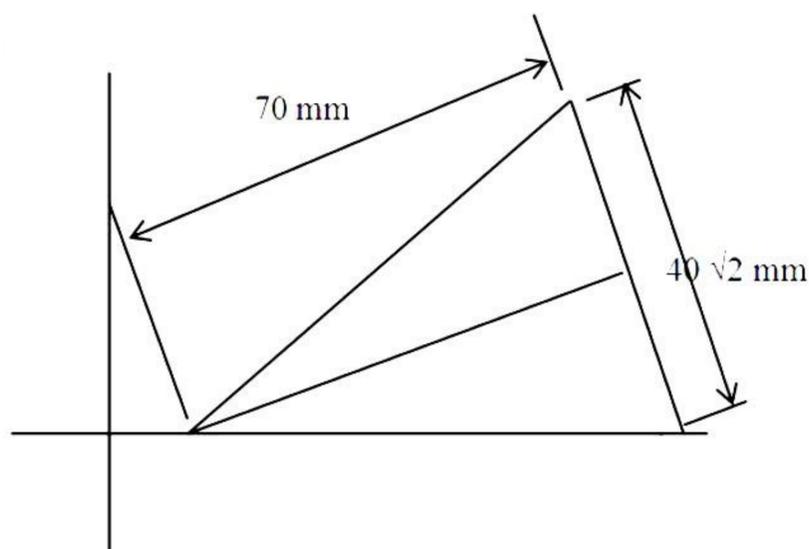


- (A) both triangular faces are parallel to HP
- (B) both triangular faces are parallel to VP
- (C) both triangular faces are parallel to HP and VP
- (D) both triangular faces are perpendicular to HP and VP

125. The front view of a cylinder consists of two ellipses with tangents connecting them. If the minor axes are parallel to XY line, how is the actual position of the cylinder?

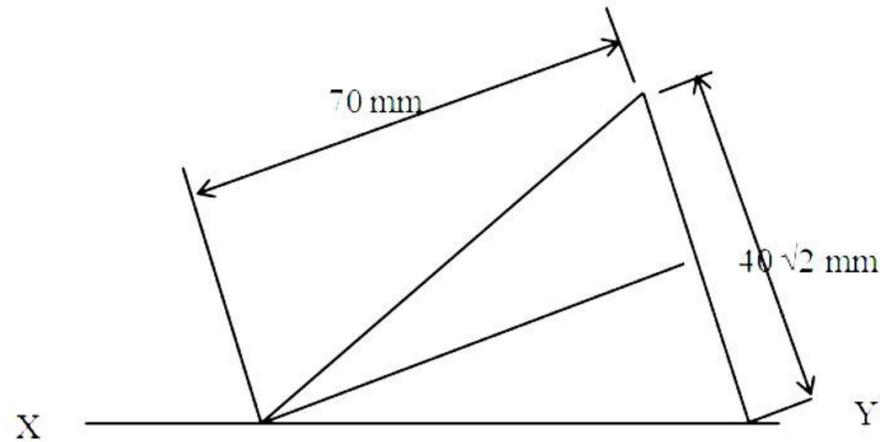
- (A) Axis parallel to VP and inclined to HP
- (B) Axis parallel to VP and parallel to HP
- (C) Axis parallel to HP and inclined to VP
- (D) Axis perpendicular to HP and parallel to VP

126. The drawing represents the endview from left of a square pyramid 40 mm side of base and 70 mm axis (I angle projection). Which statement is wrong?

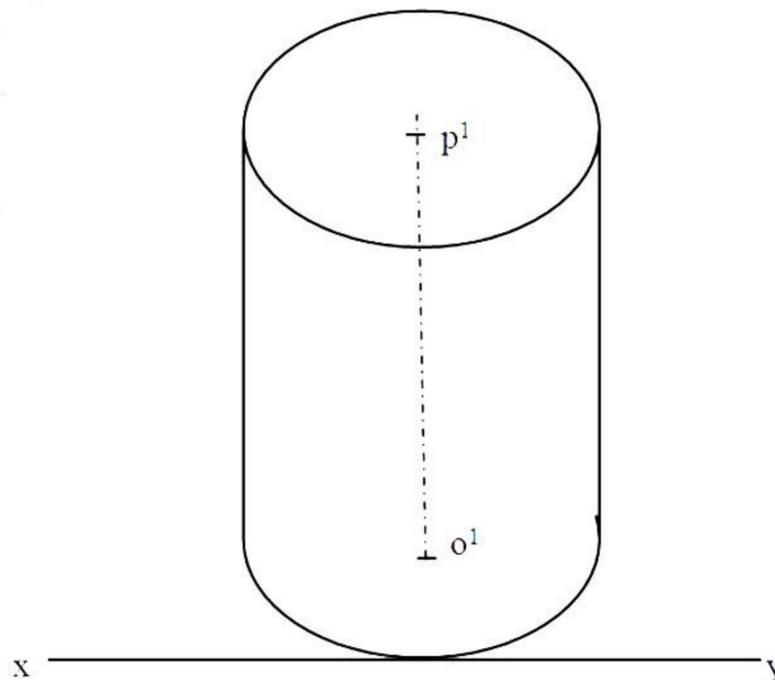


- (A) Base of the pyramid is nearer to VP than the apex
- (B) Inclination of axis to VP is more than inclination to HP
- (C) Sum of the angles of inclination of axis to HP and VP is 90°
- (D) Apex of the pyramid is nearer to VP than the base

127. The drawing represents the front view of a square pyramid 40 mm side of base and 70 mm axis (I angle projection). Which statement is correct?



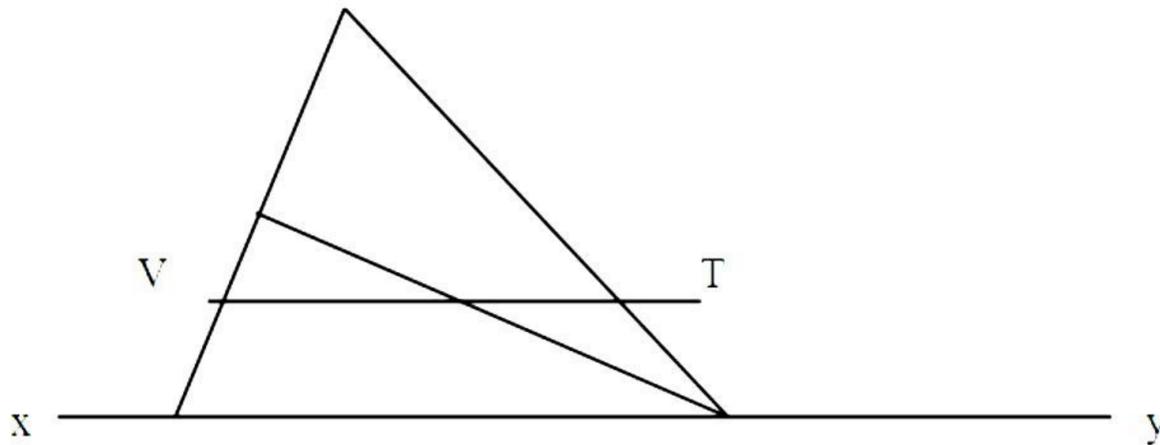
- (A) One diagonal of base is parallel to VP
 (B) One diagonal of base is inclined to HP by 45°
 (C) Base is nearer to VP than the apex
 (D) Apex is nearer to VP than the base
128. When an octahedron is suspended on a string tied at a corner, its top view will be a
- (A) Hexagon
 (B) Octagon
 (C) Square
 (D) Rhombus
129. The drawing shown here represents the front view of a cylinder. Which statement is correct?



- (A) Base of cylinder is nearer to VP than the top
 (B) Axis is perpendicular to HP
 (C) Axis is perpendicular to VP
 (D) Top face of cylinder is nearer to VP than the base

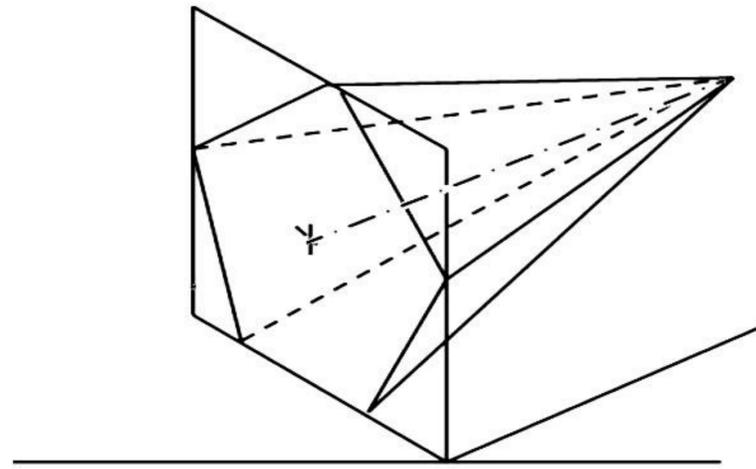
130. A cone of 50 mm diameter and 50 mm axis length rests on the ground on its base. What is the shape of the front view?
- (A) Equilateral triangle
 - (B) Circle
 - (C) Isosceles triangle
 - (D) Right angled triangle
131. A regular tetrahedron has
- (A) 4 corners
 - (B) 6 corners
 - (C) 3 corners
 - (D) 5 corners
132. A regular octahedron has
- (A) 8 corners
 - (B) 6 corners
 - (C) 4 corners
 - (D) 12 corners
133. A sphere of 60 mm radius sits on the ground. Another sphere of 20 mm radius also sits on the ground touching the bigger sphere. What is the approximate distance between the points of contact of the two spheres on the ground?
- (A) 60 mm
 - (B) 70 mm
 - (C) 80 mm
 - (D) 53 mm
134. To get the true shape as the biggest possible triangle when a cone is cut, the cutting plane should
- (A) cut the base
 - (B) pass through the apex
 - (C) be parallel to end generator
 - (D) contain the axis

135. A hexagonal pyramid lying on HP on triangular face is cut by a plane parallel to HP as shown in figure. What is the true shape of section?



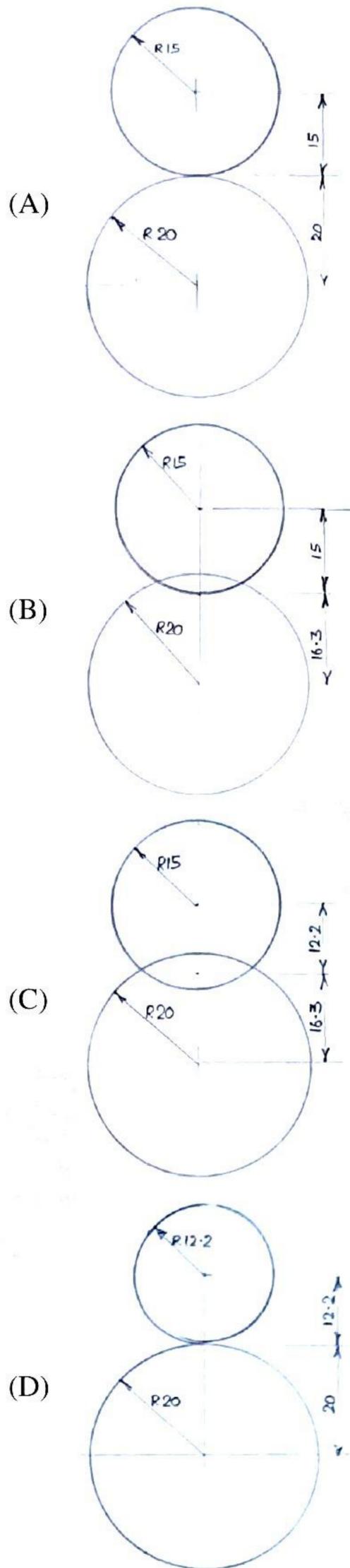
- (A) triangle
(B) trapezium
(C) hexagon
(D) square
136. A hexagonal pyramid is to be cut by a plane to get the true shape as a regular hexagon of side equal to half the side of base. Where is the cutting plane?
- (A) Parallel to HP bisecting the axis
(B) Parallel to the base bisecting the axis
(C) Inclined to VP bisecting the axis
(D) None of the above
137. Perspective views of lines that are parallel to picture plane and ground plane
- (A) will have actual lengths
(B) will be parallel to ground line
(C) will lie on horizon line
(D) None of the above
138. We will see the perspective view of a line as a point whenever
- (A) line perpendicular to GP
(B) line perpendicular to PP
(C) height of observer equal to length of line
(D) None of the above
139. Isometric view of a sphere of radius "R" is
- (A) a circle of radius $(R/0.816)$
(B) an ellipse of major axis $2R$
(C) an ellipse of major axis $(2R/0.816)$
(D) a circle of radius R

140. Isometric view of a pentagonal pyramid shown here. Which statement is correct?



- (A) It is lying on HP on a triangular face
- (B) It is lying on HP on a triangular face with axis parallel to VP
- (C) Its axis is perpendicular to VP
- (D) None of the above

141. A sphere 15 mm radius is resting on top of another sphere 20 mm radius with their centres lying in a vertical line. Out of the four drawings given below, which one represents the isometric projection? All dimensions are marked in millimetres.



142. An RF with a larger numerator and smaller denominator is preferred when we make the detailed drawing of a
- (A) bridge
 - (B) building
 - (C) watch
 - (D) land
143. Length of larger conjugate diameter of an ellipse will be
- (A) more than major axis
 - (B) between major and minor axis
 - (C) distance between two foci
 - (D) length of major axis
144. Which statement is TRUE for an ellipse?
- (A) Normal at any point on the curve passes through the focus
 - (B) Eccentricity is the ratio of minor axis to major axis
 - (C) The sum of the focal distances from any point on the ellipse is the length of the major axis
 - (D) Minor axis = $\frac{\text{distance between foci}}{2}$
145. Which statement is TRUE in the case of a parabola?
- (A) The tangents drawn at the extremities of the latus rectum meet at infinity
 - (B) The directrix is a tangent at the vertex
 - (C) If the tangent at a point P on the parabola meets the directrix at T, the perpendicular bisector of PT cut the axis at the Focus
 - (D) Double ordinate is parallel to the axis
146. Conjugate axis of a hyperbola is a line perpendicular to
- (A) the transverse axis of the hyperbola and passing through the Focus
 - (B) the directrix of the hyperbola and passing through the Vertex
 - (C) the transverse axis of the hyperbola and passing through the Vertex
 - (D) the transverse axis of the hyperbola and passing through its mid point

147. A circular lamina 50 mm diameter rests on HP on a point with the diametrically opposite point on VP in such a way that its front view is an ellipse with minor axis 40 mm. What is the shape of its top view?
- (A) Circle of 50 mm diameter
 - (B) Ellipse of minor axis 30 mm
 - (C) Circle of 40 mm diameter
 - (D) Ellipse of minor axis 40 mm
148. A circular lamina 50 mm diameter rests on HP on a point with the diametrically opposite point on VP in such a way that its top view and front view are identical ellipses. The lamina in this position is
- (A) Lying in profile plane
 - (B) Inclined at 45° to both HP and VP
 - (C) Inclined at 60° HP and 30° to VP
 - (D) Inclined at 30° HP and 60° to VP
149. The true shape of a lamina is visible in the side view. How is the lamina?
- (A) Parallel to HP and perpendicular to VP
 - (B) Parallel to VP and perpendicular to HP
 - (C) Perpendicular to both HP and VP
 - (D) Inclined to both HP and VP
150. An isosceles triangular lamina of base 50 mm and altitude 70 mm is visible as an equilateral triangle in the front view with all sides inclined to XY line. How is the lamina?
- (A) Inclined to both HP and VP
 - (B) Parallel to VP
 - (C) Perpendicular to both HP and VP
 - (D) Parallel to HP
151. A line joining some fixed points on the main survey lines is called a
- (A) check line
 - (B) tie line
 - (C) base line
 - (D) None of the above

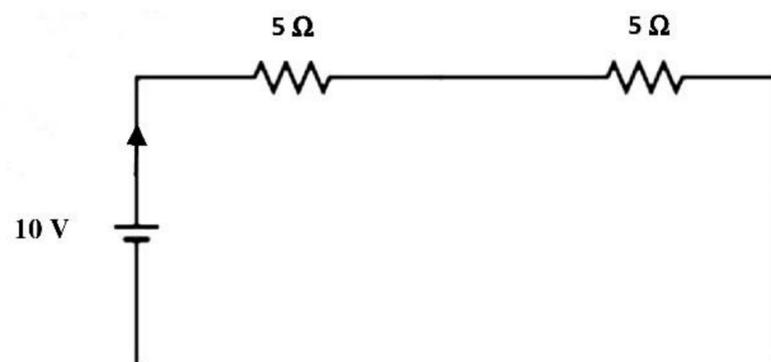
152. The horizontal angle between the true meridian and a survey line is called
- (A) magnetic bearing
 - (B) azimuth
 - (C) dip
 - (D) magnetic declination
153. The function of aggregates in concrete is to serve as
- (A) binding material
 - (B) filler
 - (C) catalyst
 - (D) All of the above
154. The indentation marks left on bricks during the process of moulding, are known as
- (A) fillets
 - (B) frogs
 - (C) projections
 - (D) marks
155. The rate of hydration and hydrolysis of cement depends upon its
- (A) fineness
 - (B) soundness
 - (C) setting time
 - (D) tensile strength
156. When heavy structural loads from columns are required to be transferred to a soil of low bearing capacity, the most economical foundation is
- (A) shallow foundation
 - (B) deep foundation
 - (C) raft foundation
 - (D) grillage foundation
157. When a heavy structure is to be constructed in sandy soil, the foundation used is
- (A) pier foundation
 - (B) strap foundation
 - (C) raft foundation
 - (D) None of the above

158. The most commonly used bond for all wall thicknesses is
- (A) English bond
 - (B) Flemish bond
 - (C) Stretching bond
 - (D) Heading bond
159. A block of stone or concrete provided under the end of tie beam to spread the load from the roof over a large area of bearing is called
- (A) gable
 - (B) hip
 - (C) verge
 - (D) template
160. The process of obtaining increased density of soil in a fill by reduction of its pore space by the expulsion of air is known as
- (A) soil exploration
 - (B) soil stabilisation
 - (C) soil compaction
 - (D) consolidation
161. The stroke of an IC engine equals
- (A) half the crank radius
 - (B) the crank radius
 - (C) twice the crank radius
 - (D) four times the crank radius
162. Which of the following process is **NOT** associated with Diesel cycle?
- (A) Constant volume
 - (B) Constant pressure
 - (C) Isothermal
 - (D) Adiabatic
163. Which statement corresponds to zeroth law of thermodynamics?
- (A) Work can be completely converted into heat
 - (B) Two systems in thermal equilibrium with a third system are in thermal equilibrium with each other
 - (C) There cannot be transfer of heat from a system at low temperature to another system at high temperature
 - (D) It is practically impossible to attain a zero degree absolute temperature

164. First law of thermodynamics refers to conservation of
- (A) mass
 - (B) momentum
 - (C) energy
 - (D) force
165. The equation of state $pv = nRT$ is essentially valid for a
- (A) real gas
 - (B) ideal gas
 - (C) monoatomic gas
 - (D) mixture of gases
166. The critical temperature for steam is
- (A) 313°C
 - (B) 347°C
 - (C) 374°C
 - (D) 409°C
167. Scales are formed on the boiler surface when the boiler feed water contains
- (A) dissolved gases
 - (B) oils and suspended solids
 - (C) calcium and magnesium salts
 - (D) insoluble compounds
168. Blading efficiency is also known as
- (A) stage efficiency
 - (B) overall efficiency
 - (C) nozzle efficiency
 - (D) diagram efficiency
169. Accumulation of carbon deposits on the cylinder head of an IC engine leads to increase in
- (A) clearance volume
 - (B) swept volume
 - (C) piston displacement
 - (D) compression ratio

170. For a particular reaction turbine, the enthalpy drops in the moving blade and in the fixed blade are stated to be 15 kJ/kg and 25 kJ/kg respectively. The degree of reaction for the turbine is
- (A) 0.375
 - (B) 0.5
 - (C) 0.625
 - (D) 0.67
171. The power factor at resonance in an RLC parallel circuit is
- (A) unity
 - (B) zero
 - (C) 0.8 lag
 - (D) 0.8 lead
172. When a sinusoidal voltage is applied across the R-L parallel circuit so that $R = X_L$, then the phase angle will
- (A) 45° lag
 - (B) 45° lead
 - (C) 90° lag
 - (D) 90° lead
173. In a three phase AC circuit, the sum of all the three generated voltages is
- (A) infinite
 - (B) zero
 - (C) one
 - (D) 230 v
174. The SI unit of magnetic flux is
- (A) Henry
 - (B) Ampere-turn/weber
 - (C) Ampere/meter
 - (D) Weber
175. The reciprocal of reluctance is
- (A) Susceptibility
 - (B) Reluctivity
 - (C) Permeance
 - (D) Permeability

176. The impedance of an ammeter and voltmeter is respectively
- (A) High, high
 - (B) High, low
 - (C) Low, high
 - (D) Low, low
177. An Oscillator Circuit which is very commonly used in Radio receivers and television is
- (A) RC Circuit
 - (B) RL Circuit
 - (C) RLC Circuit
 - (D) All of the above
178. Which of the following electrical laws is used to determine the direction of induced current?
- (A) Faraday's Law
 - (B) Lenz's Law
 - (C) Coulomb's Law
 - (D) Ohm's Law
179. Line Current and Phase Current are same in which type of Connection?
- (A) Star Connection
 - (B) Delta Connection
 - (C) Star-Delta Connection
 - (D) Delta-Delta Connection
180. Calculate the electric current in the circuit shown below



- (A) 1
- (B) 0.8
- (C) 0.5
- (D) 2

181. Name the diode that can be used as a variable capacitor
- (A) Tunnel diode
 - (B) Light emitting diode
 - (C) Varactor diode
 - (D) Signal diode
182. is known as a self generating transducer
- (A) Secondary transducer
 - (B) Analog transducer
 - (C) Active transducer
 - (D) Passive transducer
183. Which of the following transducer can be used for transmitting and receiving acoustic energy?
- (A) Piezoelectric crystal
 - (B) LVDT
 - (C) RTD
 - (D) Strain gauge
184. Which modulation consist of both the lower and upper side bands?
- (A) VSB
 - (B) SSB-SC
 - (C) DSB-SC
 - (D) None of the above
185. Which coupling method is used for impedance matching in RF amplifiers?
- (A) RC coupling
 - (B) Direct coupling
 - (C) Transformer coupling
 - (D) LC coupling
186. A full duplex system provides
- (A) Bidirectional communication
 - (B) Unidirectional communication
 - (C) Omni directional communication
 - (D) None of the above

187. Maximum Peak to Peak voltage of an AM wave is 12 mV and the minimum peak to peak voltage is 6 mV. Calculate modulation factor
- (A) 0.44
 - (B) 0.33
 - (C) 0.22
 - (D) 0.11
188. Piezo Electric transducers produce electricity by the application of as input
- (A) Light
 - (B) Temperature
 - (C) External pressure
 - (D) Velocity
189. Higher Band width and better sound Quality is a characteristic of
- (A) AM
 - (B) FM
 - (C) PM
 - (D) All of the above
190. The applied input AC power to a half wave rectifier is 200 watts. The DC output power obtained is 20 watts. What is the rectifier efficiency?
- (A) 10%
 - (B) 20%
 - (C) 30%
 - (D) 40%
191. The default file extension created by Notepad is
- (A) .txt
 - (B) .jpg
 - (C) .doc
 - (D) .xml
192. Printing head and paper is touched in
- (A) Non-impact printer
 - (B) Impact printer
 - (C) Both (A) and (B)
 - (D) Thermal printer

193. Data communication system within a building or campus is
- (A) MAN
 - (B) LAN
 - (C) WAN
 - (D) None of the above
194. The communication protocol used by Internet is
- (A) HTTP
 - (B) WWW
 - (C) TCP/IP
 - (D) FTP
195. Which memory translates one line at a time?
- (A) Interpreter
 - (B) Translator
 - (C) Simulator
 - (D) Compiler
196. Which header file defines Input/Output function prototypes and macros?
- (A) conio.h
 - (B) stdlib.h
 - (C) stdio.h
 - (D) dos.h
197. Which of the following is not an input device?
- (A) Keyboard
 - (B) Monitor
 - (C) Joystick
 - (D) Microphone
198. Which of the following operator has the highest precedence in C programming language?
- (A) Arithmetic operators
 - (B) Relational operators
 - (C) Equality operators
 - (D) Logical operators

199. The function in C programming language that enables the user to input information while the programme is in execution.

- (A) printf
- (B) &&
- (C) putchar
- (D) scanf

200. is a language that a computer understands

- (A) Machine language
- (B) Assembly language
- (C) High level language
- (D) All of the above

FINAL ANSWER KEY**Subject Name: 102 LATERAL ENTRY TO B TECH**

SI No.	Key								
1	C	31	D	61	C	91	D	121	B
2	B	32	A	62	C	92	B	122	C
3	B	33	C	63	A	93	D	123	A
4	C	34	B	64	B	94	D	124	D
5	C	35	A	65	C	95	B	125	C
6	B	36	C	66	C	96	A	126	A
7	C	37	A	67	B	97	B	127	A
8	A	38	C	68	C	98	A	128	C
9	C	39	B	69	D	99	B	129	A
10	A	40	C	70	C	100	C	130	C
11	C	41	C	71	C	101	B	131	A
12	A	42	A	72	D	102	C	132	B
13	B	43	C	73	D	103	C	133	B
14	C	44	C	74	C	104	B	134	D
15	B	45	B	75	D	105	C	135	B
16	B	46	A	76	B	106	A	136	B
17	B	47	B	77	C	107	C	137	B
18	B	48	D	78	C	108	A	138	D
19	B	49	D	79	B	109	D	139	A
20	B	50	A	80	A	110	D	140	C
21	A	51	A	81	B	111	D	141	C
22	B	52	C	82	B	112	B	142	C
23	C	53	B	83	B	113	A	143	B
24	D	54	A	84	D	114	D	144	C
25	C	55	B	85	A	115	B	145	C
26	D	56	A	86	B	116	D	146	D
27	C	57	D	87	C	117	D	147	B
28	B	58	D	88	A	118	D	148	B
29	D	59	C	89	C	119	C	149	C
30	B	60	D	90	C	120	D	150	A

SI No.	Key	SI No.	Key
151	B	181	C
152	B	182	C
153	B	183	A
154	B	184	C
155	A	185	C
156	D	186	A
157	A	187	B
158	A	188	C
159	D	189	B
160	C	190	A
161	C	191	A
162	C	192	B
163	B	193	B
164	C	194	C
165	B	195	A
166	C	196	C
167	C	197	B
168	D	198	A
169	D	199	D
170	A	200	A
171	A		
172	B		
173	B		
174	D		
175	C		
176	C		
177	C		
178	B		
179	A		
180	A		