102LET11

ROLL No. | | | | | |

QN. BOOKLET No. **1041**

TEST FOR LATERAL ENTRY TO B.TECH DEGREE PROGRAMMES

Time: 3 Hours | Maximum Marks: 600

INSTRUCTIONS TO CANDIDATES

1. You are provided with a Question Booklet and an Optical Mark Reader (OMR) Answer Sheet to mark your responses. Do not soil your OMR Sheet. Read carefully all the instructions given on the OMR Sheet.

2. Write your Roll Number in the space provided on the top of **this page.**

3. Also write your Roll Number and the date and time of the examination in the columns provided for the same on the **Answer Sheet.** Darken the appropriate bubbles with HB pencil.

4. This paper consists of 200 objective type questions as detailed below:-

(i)	English	: 20 Nos. (Serial No. 1 to 20)
(ii)	Mathematics	: 50 Nos. (Serial No. 21 to 70)
(iii)	Engineering Mechanics	: 40 Nos. (Serial No. 71 to 110)
(iv)	Engineering Graphics	: 40 Nos. (Serial No. 111 to 150)
(v)	General Engineering	: 50 Nos. (Serial No. 151 to 200)

5. Each Question has four alternative responses marked **A, B, C** and **D** and you have to **darken** the bubble fully by **HB pencil** corresponding to the correct response as indicated in the example shown on the Answer Sheet. Also write the alphabet of your response with ball pen in the starred column against attempted questions and put an '×' mark by ball pen in the starred column against unattempted questions as given in the example in the OMR Sheet.

6. Each correct answer carries **3** marks and each wrong answer carries **1** minus mark.

7. Please do your rough work only on the space provided for it at the end of this question booklet.

8. You should return the Answer Sheet to the Invigilator before you leave the examination hall. However Question Booklet may be retained with the Candidate.

9. Every precaution has been taken to avoid errors in the Question Booklet. In the event of such unforeseen happenings, suitable remedial measures will be taken at the time of evaluation.

10. Please feel comfortable and relaxed. You can do better in this test in a tension-free disposition.

WISH YOU A SUCCESSFUL PERFORMANCE

ENGLISH

1. Read the passage carefully and choose the correct statement from the choices given below:

Except for the so called religious differences, the people of Pakistan and India have throughout history, shared the same destiny, culture, geography and several other common features. There could be politicians in the sub-continent and a few abroad who nurse a vested interest in keeping the differences between the two countries in the boil. But the leaders of both the countries, dictated by their innate wisdom, know full well, that both of them have a world to win if they learn to go together sinking their differences.

(A) The people of India and Pakistan have no common features
(B) The leaders of India and Pakistan know fully well that they may win a lot if they stand together
(C) No one has a vested interest in keeping the differences between the two countries in the boil
(D) The leaders of the two countries always stand together

Direction: (Questions 2 and 3) Pick out the 'incorrect part' from the following sentences.

2. He commented (a) that (b) the streets were (c) full in dirt. (d)

(A) a (B) b
(C) c (D) d

3. Medium paced bowlers (a) in cricket (b) deceiving the batsmen (c) by swinging the ball. (d)

(A) a (B) b
(C) c (D) d

Direction: (Questions 4 to 6) Pick out the correct meaning of the underlined idioms from the answers given.

4. I asked him to keep an eye on my luggage while I went to the toilet.

(A) watch (B) look
(C) see (D) hold on

5. They have gone <u>for good</u>.

(A) forever
(B) for doing good
(C) for a good future
(D) for a good deed

6. He was <u>pulling my leg</u> when he made that comment.

(A) angry at me
(B) upset about me
(C) criticising me
(D) joking by saying that something is true when in fact it is not true

Direction: (Questions 7 to 9) <u>Choose the correct question tag</u> for the following.

7. We work hard, ...?

(A) are we
(B) do we
(C) don't we
(D) didn't we

8. Something is better than nothing, ...?

(A) is something
(B) is it
(C) isn't it
(D) was it

9. She came here yesterday, ...?

(A) didn't she
(B) did she
(C) has she
(D) wasn't she

Direction: (Questions 10 and 11) <u>Correct the underlined part</u> of the given sentences, <u>if necessary</u>, using the choices given.

10. Our clients prefer our new office timings because they <u>are convenience for</u> them.

(A) is convenient to
(B) are convenient for
(C) are convenience to
(D) no error

11. In ancient days the Japanese wife was expected to <u>wait for</u> her husband hand and foot.

(A) wait upon
(B) wait in
(C) wait to
(D) wait at

Direction: (Questions 12 and 13) Select the correct form of passive voice for the following.

12. Raju was writing a novel.

(A) A novel is written by Raju
(B) A novel has been written by Raju
(C) A novel was written by Raju
(D) A novel was being written by Raju

13. Who discovered America?

(A) America was discovered by whom?
(B) America was discovered by which person?
(C) By whom was America discovered?
(D) America was discovered by who?

Direction: Choose the most suitable implied meaning for the following saying.

14. A friend in need is a friend indeed.

(A) A good friend is one who does not need anything from us.
(B) A good friend is always sincere.
(C) A real friend always helps us.
(D) A true friend is that one who helps us when we are in real need

Direction: (Questions 15 and 16) Choose the word which is most similar in meaning.

15. Obsolete

(A) Pleasant
(B) Sincere
(C) Fashionable
(D) Out of date

16. Vanquish

(A) Defeat
(B) Dismiss
(C) Decorate
(D) Dislike

Direction: Choose the most suitable word opposite in meaning.

17. Transient

(A) Big
(B) Unimportant
(C) Permanent
(D) Serious

Direction: (Questions 18 to 20) Fill in the blanks with suitable answers from the choices given below.

18. My child was born ..... France.

(A) at
(B) in
(C) of
(D) for

19. In order to gain success in life everyone has to ..... laziness.

(A) sleep over
(B) do away with
(C) take steps against
(D) favour

20. He ..... me on my success.

(A) criticized
(B) agreed
(C) concerned
(D) complimented

MATHEMATICS

21. The derivative of $\frac{ax+b}{cx+d}$ is

(A) $\frac{(ad+bc)^2}{cx+d}$
(B) $\frac{ad-bc}{(cx+d)^2}$
(C) $\frac{ad+bc}{(cx+d)^2}$
(D) None of the above

22. $\lim_{x \to 1} \frac{\sqrt{5x-4}-\sqrt{x}}{x-1}$ is

(A) 1
(B) 2
(C) −1
(D) −2

23. If $y=\sqrt{1-x^2}$, the value of x, when $\frac{dy}{dx}=1$ is

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

24. The derivative of x^x is

(A) x^x
(B) $x^x(1+\log x)$
(C) $\frac{1}{1+\log x}$
(D) $\frac{x^x}{1+\log x}$

25. The point of the curve $y^2=x^2(20-x)$, where the tangent is perpendicular to the X-axis is

(A) (0, 0)
(B) (0, 20)
(C) (20, 0)
(D) (1, −1)

26. The ratio in which the line joining (2, 4, 16) and (3, 5, −4) is divided by the plane $2x-3y+z+6=0$ is

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

27. The equation to the plane through (2, 3, 4) and parallel to the plane $x+2y+4z=5$ is

(A) $2x+4y+8z=45$
(B) $x+2y+4z=3$
(C) $x+2y+4z=24$
(D) $2x+4y+8z=29$

28. The distance between the planes $2x-2y+z+3=0$ and $4x-4y+2z+5=0$ is

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

(C) $\frac{1}{5}$ (D) $\frac{1}{6}$

29. The equation of the tangent plane to the sphere $x^2+y^2+z^2+2x+4y-6z-6=0$ at (1, 2, 3) is

(A) $x-4y+6=0$ (B) $2x+4y-10=0$

(C) $2x-4y+9=0$ (D) $x+4y-8=0$

30. The function $y=2x^3-9x^2-24x-20$ has a maximum value at

(A) $x=1$ (B) $x=-4$
(C) $x=-1$ (D) $x=4$

31. If $A=\begin{bmatrix}3 & 2 & 7\end{bmatrix}$ and $B=\begin{bmatrix}1 & 4 & 8\\ 2 & 6 & 9\\ 3 & 7 & 10\end{bmatrix}$, then the product AB is

(A) $\begin{bmatrix}4 & 6 & 8\end{bmatrix}$ (B) $\begin{bmatrix}8 & 10 & 12\end{bmatrix}$

(C) $\begin{bmatrix}28 & 73 & 112\end{bmatrix}$ (D) $\begin{bmatrix}50 & 75 & 100\end{bmatrix}$

32. The solution of the system of simultaneous equations

$2x+y+4z=2$

$x+3y-2z=7$

$5x+3y-5z=-8$

is given by

(A) $x=-3, y=4, z=1$ (B) $x=3, y=4, z=1$

(C) $x=3, y=3, z=2$ (D) $x=-3, y=-4, z=1$

33. The rank of the matrix $\begin{bmatrix} 1 & 4 & 5 \\ 2 & 6 & 8 \\ 3 & 7 & 22 \end{bmatrix}$ is

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

34. The system of equations:
$x-4y+7z=14,$
$3x+8y-2z=13,$
$7x-8y+26=-5,$
is

(A) consistent
(B) inconsistent
(C) has a unique solution
(D) has infinitely many solutions

35. The position vector of the point which divides the line joining (1, 2, 3) and (2, 3, 5) in the ratio 2:3 is

(A) $\frac{1}{5}\left(3\vec{i}+4\vec{j}+7\vec{k}\right)$
(B) $\frac{1}{5}\left(7\vec{i}+12\vec{j}+19\vec{k}\right)$
(C) $\frac{1}{5}\left(6\vec{i}+8\vec{j}+13\vec{k}\right)$
(D) $\frac{1}{5}\left(4\vec{i}+3\vec{j}+7\vec{k}\right)$

36. If $\vec{a}=2\vec{i}+\vec{j}-8\vec{k}$, $\vec{b}=\vec{i}+3\vec{j}-4\vec{k}$, the magnitude of $\vec{a}-2\vec{b}$, is

(A) 3
(B) 4
(C) 5
(D) 6

37. The value of $\int_0^{\frac{\pi}{3}} \sec(x)\tan(x)\,dx$ is

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

38. The definite integral $\int_0^{\sqrt{3}} \frac{dx}{1+x^2}$ has the value

(A) 0 (B) $\frac{\pi}{4}$

(C) $\frac{\pi}{2}$ (D) $\frac{\pi}{12}$

39. The value of the indefinite integral $\int \frac{e^x + e^{-x}}{e^x - e^{-x}} dx$ is

(A) $\frac{e^x + e^{-x}}{2}$ (B) $\log\left(e^x + e^{-x}\right)$

(C) $\log\left(e^x - e^{-x}\right)$ (D) $\frac{e^x - e^{-x}}{e^x + e^{-x}}$

40. The solution for the differential equation: $x(y-x)\frac{dy}{dx} = y(x+y)$ is

(A) $\frac{y}{x} = \log xy + c$ (B) $y = \log xy + \log x + c$

(C) $y = \log x + \log x^2 + c$ (D) $y = \log x + \log y^2 + c$

41. The value of $\frac{\sin\left(90^0 - 57^0\right)}{\cos 57^0} + \frac{\cos\left(90^0 - 33^0\right)}{\sin 33^0}$ is

(A) 0 (B) 1
(C) −1 (D) 2

42. The value of $\frac{\tan 35^0}{\cot 55^0} + \frac{\cot 78^0}{\tan 12^0} - 1$ is

(A) 0 (B) 1
(C) 2 (D) −2

43. If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$, the value of $\cos\theta - \sin\theta$ is

(A) $\sqrt{2}$ (B) $\sqrt{2}\cos\theta$
(C) $\sqrt{2}\sin\theta$ (D) $\sqrt{2}\sin\theta\cos\theta$

44. The value of $\sin^2\theta + \frac{1}{1+\tan^2\theta}$ is

(A) 0 (B) 1
(C) 2 (D) $\sec^2\theta + \tan^2\theta$

45. If $2\sin\theta = 1$, the value of $\sec\theta + \tan\theta$ is

(A) 0 (B) $\sqrt{2}$
(C) $\sqrt{3}$ (D) 1

46. The value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ ... \cos 180^\circ$ is

(A) 1 (B) $-\sqrt{3}$
(C) $\sqrt{3}$ (D) 0

47. The point on the X-axis which is equidistant from (7, 6) and (−3, 4) is

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

48. The centre of the circle passing through (5, −8), (2, −9) and (2, 1) is

(A) (2, 4) (B) (2, −4)
(C) (−2, 4) (D) (−2, −4)

49. The angle subtended at the origin by the line segment whose end points are (0, 100) and (10, 0) is

(A) 30° (B) 45°
(C) 60° (D) 90°

50. The vertex of the parabola $y = 2x^2 - 4x$ is

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

51. If $f(x) = (x+7)^2$ and $g(x) = \frac{x}{x+1}$ then $(g \circ f)(x)$ is

(A) $\frac{1}{(x+7)^2}$
(B) $\frac{1}{(x+7)^2+1}$
(C) $\frac{1}{x+7}$
(D) $\frac{(x+7)^2}{(x+7)^2+1}$

52. The roots of the quadratic equation $\frac{1}{x} - \frac{x}{x+2} = 0$ are

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

53. The minimum value of the function $f(x) = x^3 - 9x^2 - 48x + 52$ in the interval $-5 \le x \le 14$ is

(A) 300
(B) −312
(C) −396
(D) 408

54. The value of $\int x^3\sqrt{x^4+5}\,dx$ is

(A) $\frac{1}{4}(x^3+1)^{\frac{1}{2}} + c$
(B) $\frac{1}{4}(x^4+1)^{\frac{1}{2}} + c$
(C) $\frac{1}{6}\left(x^2\sqrt{x^4+5}\right) + c$
(D) $\frac{1}{6}(x^4+5)^{\frac{3}{2}} + c$

55. A father's age was three times that of his son five years ago. After five years the father will be twice as old as his son. The present age of the father is

(A) 25 years
(B) 30 years
(C) 35 years
(D) 40 years

56. If $\phi(x, y, z) = 3x^2y - y^3z^2$, then the gradient $\nabla\phi$, at the point $(1, -2, -1)$ is

(A) $12\vec{i} + \vec{j} - 5\vec{k}$ (B) $5\vec{i} - 3\vec{j} + 6\vec{k}$

(C) $-12\vec{i} - 9\vec{j} - 16\vec{k}$ (D) $-15\vec{i} + 25\vec{j} - 2\vec{k}$

57. If $\vec{A} = xz^3\vec{i} - 2x^2yz\vec{j} + 2yz^4\vec{k}$ then curl $\vec{A}$ at the point $(1, -1, 1)$ is

(A) 5 (B) 0

(C) $3\vec{j} + 4\vec{k}$ (D) $\vec{j} - 5\vec{k}$

58. If $\phi = 3x^2z - y^2z^3 + 4x^3y + 2x - 3y - 5$, then $\nabla^2\phi$ is

(A) $z - 4xy + z^3 - y^2z$ (B) $5z - 3xy + z^3 + y^2z$

(C) $6z + 24xy - 2z^3 - 6y^2z$ (D) $-3x - 8xy + 2z^3 - 3y^2z$

59. The points (0, 7, 10), (−1, 6, 6) and (−4, 9, 6)

(A) form an equilateral triangle (B) form a right-angled triangle
(C) form an obtuse-angled triangle (D) lie on a straight line

60. The length of the arc of a sector of a circle with radius 10.5cm and centre angle 120° $\left(\text{assume } \pi \approx \frac{22}{7}\right)$ is

(A) 24cm (B) 23cm
(C) 22cm (D) 21cm

61. One of the factors of $m^3 + 8$ is $m + 2$. The other factor is

(A) $m^2 + 2m + 4$ (B) $m^2 - 2m + 4$

(C) $m^2 - 4m + 4$ (D) $m^2 + 4m + 4$

62. The locus of a point which is equidistant from a fixed point is

(A) a circle
(B) perpendicular bisector of the straight line joining the two points
(C) angle bisector
(D) perpendicular lines

63. The centre of a circle is $(-2,3)$. One end of a diameter is $(-3,-5)$. The other end is

(A) $\left(\frac{1}{2},-1\right)$ (B) $\left(-\frac{1}{2},1\right)$
(C) $(-1,11)$ (D) $(1,-11)$

64. If $A=\begin{bmatrix} \cos\theta & 0 & \sin\theta \\ 0 & 1 & 0 \\ -\sin\theta & 0 & \cos\theta \end{bmatrix}$ the value of $|A|$ is

(A) $\cos^2\theta-\sin^2\theta$ (B) 0
(C) 1 (D) $\sin^2\theta-\cos^2\theta$

65. The square root of $16a^2+9b^2+4c^2-24ab+12bc-16ca$ is

(A) $4a+3b+2c$ (B) $4a-3b+2c$
(C) $4a+3b-2c$ (D) $-4a+3b+2c$

66. The triple which constitute the sides of a right-angled triangle is

(A) (4, 5, 6) (B) (5, 12, 14)
(C) (9, 40, 41) (D) (11, 60, 62)

67. The area of a parallelogram whose adjacent sides are $\vec{i}-2\vec{j}+3\vec{k}$ and $2\vec{i}+\vec{j}-4\vec{k}$ is

(A) $\sqrt{6}$ (B) $3\sqrt{6}$
(C) $5\sqrt{6}$ (D) $7\sqrt{6}$

68. If $\vec{A}=3\vec{i}-2\vec{j}-2\vec{k}$ and $\vec{B}=2\vec{i}+3\vec{j}+\vec{k}$, then $\left(\vec{A}+\vec{B}\right)\times\left(\vec{A}-\vec{B}\right)$ is

(A) $\vec{i}+\vec{j}-\vec{k}$ (B) $3\vec{i}+4\vec{j}+9\vec{k}$

(C) $2\vec{i}-\vec{j}-\vec{k}$ (D) $-8\vec{i}+14\vec{j}-26\vec{k}$

69. If $L\left(f(t)\right)$ denotes the Laplace transform of $f(t)$, then

(A) $L\left(f(t)+g(t)\right)=L\left(f(t)\right)-L\left(g(t)\right)$

(B) $L\left(f(t)+g(t)\right)=L\left(f(t)\right)+L\left(g(t)\right)$

(C) $L\left(f(t)+g(t)\right)=L\left(f(t)\right)\times L\left(g(t)\right)$

(D) $L\left(f(t)+g(t)\right)=L\left(f(t)\right)\div L\left(g(t)\right)$

70. The value of $\int_0^{\frac{\pi}{2}} e^{\cos\theta}\sin\theta\, d\theta$ is

(A) 1 (B) e

(C) $e-1$ (D) 0

ENGINEERING MECHANICS

71. The periodic time T is given by the following expression when motion of the body is in S.H.M. (D = displacement and A = acceleration).

(A) $T=2\pi\sqrt{\frac{D}{A}}$ (B) $T=\frac{1}{2\pi}\sqrt{\frac{D}{A}}$

(C) $T=\pi\sqrt{\frac{D}{A}}$ (D) $T=\frac{1}{\pi}\sqrt{\frac{D}{A}}$

72. The velocity of a body moving in S.H.M is maximum when its acceleration is

(A) zero
(B) maximum
(C) mean
(D) None of the above

73. The kinetic energy of a body of mass (m) and velocity (v) is equal to

(A) mv
(B) $\frac{mv}{2}$
(C) $\frac{m^2v}{2}$
(D) $\frac{mv^2}{2}$

74. Energy may be defined as

(A) power of doing work
(B) capacity of doing work
(C) rate of doing work
(D) All of the above

75. One watt is equal to

(A) 0.1 Joule/sec
(B) 1 Joule/sec
(C) 10 Joule/sec
(D) 100 Joule/sec

76. Work may be defined as

(A) force × distance
(B) force × velocity
(C) force × acceleration
(D) force × time

77. A ball of mass 1 kg moving with a velocity of 2m/sec collides directly on a stationary ball of mass 2 kg and comes to rest after impact. The velocity of the second ball after impact will be

(A) zero
(B) 0.5m/sec
(C) 1.0m/sec
(D) 2.0m/sec

78. For perfectly elastic bodies, value of coefficient of restitution is

(A) zero
(B) 0.5
(C) 1.0
(D) between 0 and 1

79. If u_1 and u_2 are the velocities of approach of two moving bodies in the same direction and their corresponding velocities of separation are v_1 and v_2 then, as per Newton's law of collision of elastic bodies, the coefficient of restitution (e) is given by

(A) $e=\frac{v_1-v_2}{u_1-u_2}$ (B) $e=\frac{u_2-u_1}{v_1-v_2}$

(C) $e=\frac{v_2-v_1}{u_1-u_2}$ (D) $e=\frac{v_1-v_2}{u_2-u_1}$

80. If a horizontal surface is moving up, on which a body of mass m is placed and acceleration of surface is f, then force causing motion is

(A) $m(g+f)$ (B) $m(g-f)$

(C) $m(f-g)$ (D) mf

81. If two bodies of masses m_1 and m_2 ($m_1 > m_2$) are connected by a light inextensible string passing over a smooth pulley, when m_2 lies on smooth inclined plane having 'α' inclination with the horizontal and m_1 is suspended freely, then tension in the string will be given by

(A) $\frac{m_1m_2(1+\sin\alpha)}{m_1+m_2}g$ (B) $\frac{m_1m_2(1-\sin\alpha)}{m_1+m_2}$

(C) $\frac{m_1m_2(1+\sin\alpha)}{g(m_1+m_2)}g$ (D) $\frac{(m_1-m_2\sin\alpha)}{(m_1+m_2)}g$

82. If two bodies of masses m_1 and m_2 ($m_1>m_2$) are connected by a light inextensible string passing over a smooth pulley, the tension in the string will be given by

(A) $\frac{2m_1m_2}{m_1+m_2}\times g$ (B) $\frac{(m_1-m_2)g}{(m_1+m_2)}$

(C) $\frac{2m_1m_2}{m_1-m_2}\times g$ (D) $\frac{(m_1+m_2)g}{(m_1-m_2)}$

83. If G is gauge of the track, v is velocity of the moving vehicle, g is acceleration due to gravity and r is the radius of a circular path, super elevation required is

(A) $\frac{gv^2}{Gr}$ (B) $\frac{Gr}{gv}$

(C) $\frac{Gr^2}{gv^2}$ (D) $\frac{Gv^2}{gr}$

84. The centripetal acceleration of a *moving* body along the circular path of radius r, is

(A) $\frac{r}{v^2}$ (B) $\frac{v^2}{r}$

(C) $\frac{r}{\omega^2}$ (D) $r\omega$

85. The linear velocity (v) of a moving particle along the circumference of a circle of radius (r), with a uniform angular velocity (ω) rad/sec is given by

(A) $v = r\omega^2$ (B) $v = r.\omega$

(C) $v = r^2.\omega$ (D) $v = \frac{\omega}{r}$

86. The maximum height of a projectile on a horizontal range is

(A) $\frac{u^2 \sin 2\alpha}{2g}$ (B) $\frac{u^2 \sin \alpha}{2g}$

(C) $\frac{u^2 \sin 2\alpha}{g}$ (D) $\frac{u^2 \sin^2 \alpha}{2g}$

87. The horizontal range of a projectile is

(A) $\frac{u \sin 2\alpha}{g}$ (B) $\frac{u^2 \sin 2\alpha}{g}$

(C) $\frac{u \sin 2\alpha}{2g}$ (D) $\frac{u^2 \sin 2\alpha}{2g}$

88. For a maximum range of a projectile, the angle of projection should be

(A) 30° (B) 45°
(C) 60° (D) 75°

89. Cartesian equation of a trajectory, is

(A) $y = x\sin\alpha - \frac{gx^2}{2u^2\sin^2\alpha}$

(B) $y = x\tan\alpha - \frac{gx^2}{2u^2\tan^2\alpha}$

(C) $y = x\tan\alpha + \frac{gx^2}{2u^2\cos^2\alpha}$

(D) $y = x\tan\alpha - \frac{gx^2}{2u^2\cos^2\alpha}$

90. A path traced by a projectile in sky, is

(A) elliptical (B) circular
(C) parabolic (D) straight

91. Equations of motion of a body in a straight line is

(A) $v = u + ft$ (B) $s = ut + \frac{1}{2}ft^2$

(C) $v^2 = u^2 + 2fs$ (D) All of the above

92. The velocity ratio of a differential wheel and axle with D as the diameter of effort wheel and d_1 and d_2 as diameter of bigger and smaller axles respectively is

(A) $\frac{2D}{d_1 + d_2}$ (B) $\frac{2D}{d_1 - d_2}$

(C) $\frac{D}{d_1 + d_2}$ (D) $\frac{D}{d_1 - d_2}$

93. The force of friction between two bodies in contact

(A) depends upon the area of contact
(B) is always along the surface of contact
(C) depends upon relative velocity of bodies
(D) is normal to contacting area

94. On a ladder resting on the ground and leaning against a vertical wall, the force of friction will act

(A) upward at its upper end
(B) towards the wall at its upper end
(C) away from the wall at its upper end
(D) downwards at its upper end

95. The angle which an inclined surface makes with the horizontal when a body placed on it, is just on the point of movement down is called as,

(A) angle of repose
(B) angle of inclination
(C) angle of friction
(D) coefficient of friction

96. The maximum frictional force which comes into play, when a body just begins to slide over the surface of another body, is known as

(A) rolling friction
(B) limiting friction
(C) sliding friction
(D) dynamic friction

97. M.I of a solid sphere is

(A) Mr^2
(B) $\frac{2}{5}Mr^2$
(C) $\frac{2}{3}Mr^2$
(D) $\frac{Mr^2}{2}$

98. The moment of inertia of triangular section (base b, height h) about an axis through its C.G. and parallel to the base is

(A) $\frac{b^3h}{12}$
(B) $\frac{bh^3}{3}$
(C) $\frac{bh^3}{36}$
(D) $\frac{bh^3}{2}$

99. Moment of inertia of a square of side 'b' about an axis parallel to its side through its centre of gravity is

(A) $\frac{b^3}{4}$ (B) $\frac{b^4}{12}$

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

100. The C.G of a right circular cone of diameter 'd' and height 'h' lies at the following distance from the base measured along the vertical radius.

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

(C) $\frac{h}{4}$ (D) $\frac{h}{6}$

101. The C.G of semicircle lies at the following distance from its base measured along its vertical radius 'r' is

(A) $\frac{4r}{3\pi}$ (B) $\frac{3r}{4\pi}$

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

102. If the body is in equilibrium and is acted upon by two forces, then they must be

(A) equal (B) opposite
(C) collinear (D) All of the above

103. If three co-planer forces of same magnitude meet at a point, inclined with each other at 120°, then the system will be in

(A) equilibrium (B) motion
(C) rest (D) All of the above

104. Conditions of equilibrium are

(A) horizontal components of all the forces must be zero
(B) vertical component of all the forces must be zero.
(C) resultant moment of all the forces must be zero.
(D) All of the above

105. If the sum of all the forces acting on a body is zero, then the body may be in equilibrium, provided the forces are

(A) parallel
(B) concurrent
(C) like parallel
(D) unlike parallel

106. In a couple, the lines of action of the forces are

(A) parallel
(B) inclined
(C) vertical
(D) horizontal

107. The magnitude of the resultant of two like parallel forces 10N and 30N separated by a distances of 300mm is

(A) 20N
(B) 40N
(C) 150N
(D) 75N

108. The moment of a force about any point is geometrically equal to X times the area of the triangle whose base is the line representing the force and vertex is the point about which the moment is taken. The value of X is

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

109. If two forces 3 N and 4 N act at right angles to each other, their resultant force will be equal to

(A) 5N
(B) 7N
(C) 1N
(D) $\frac{1}{7}$N

110. If two equal forces of magnitude P act at an angle θ°, their resultant will be

(A) $P\sin\frac{\theta}{2}$ (B) $P\cos\frac{\theta}{2}$

(C) $2P\cos\frac{\theta}{2}$ (D) $P\tan\frac{\theta}{2}$

ENGINEERING GRAPHICS

111. A line is perpendicular to HP. What is its front view?

(A) A point
(B) A line of shorter in length perpendicular to XY line
(C) A line of true length perpendicular to XY line
(D) A line parallel to XY line

112. A line is perpendicular to VP. What is its top view?

(A) A point
(B) A line shorter in length
(C) A line of true length
(D) A line parallel to XY line

113. When a line is parallel to both HP and VP,

(A) side view gives true length
(B) only top view gives true length
(C) only front view gives true length
(D) both front and top views give true length

114. If the top view of a line crosses XY line, which statement given below is true?

(A) The line crosses HP (B) The line crosses VP
(C) The line is in II quadrant (D) The line is in IV quadrant

115. 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

116. If the top view and front view of a point K coincides and is above XY line, the point K is

(A) in III quadrant
(B) in II quadrant
(C) in I quadrant
(D) in IV quadrant

117. There is a straight railway line 20 km long with slope of 20° connecting Palakkad to Valayar. Another straight railway line 25 km long connects Valayar and Coimbatore which are in the same level. If Valayar is exactly to the eastern side of Palakkad, and Coimbatore is at 30° east of north with respect to Valayar, what is the direction of the newly proposed straight railway line connecting Palakkad to Coimbatore?

(A) Less than 45° East of North to Palakkad
(B) Greater than 45° East of North to Palakkad
(C) 45° East of North to Palakkad
(D) 30° East of North to Palakkad

118. A line PQ has the end P in HP and the end Q in VP. The line makes 40° with HP and 30° with VP. Which statement about this line is true?

(A) Both front and top views will be true length
(B) Top view will be longer than the front view
(C) Front view will be longer than the top view
(D) Both views will be perpendicular to XY line

119. A line AB of length 10 cm measures 7.2 cm in the top view and 8.1 cm in the front view. What is the inclination of the line AB to VP?

(A) 44°
(B) 46°
(C) 36°
(D) 54°

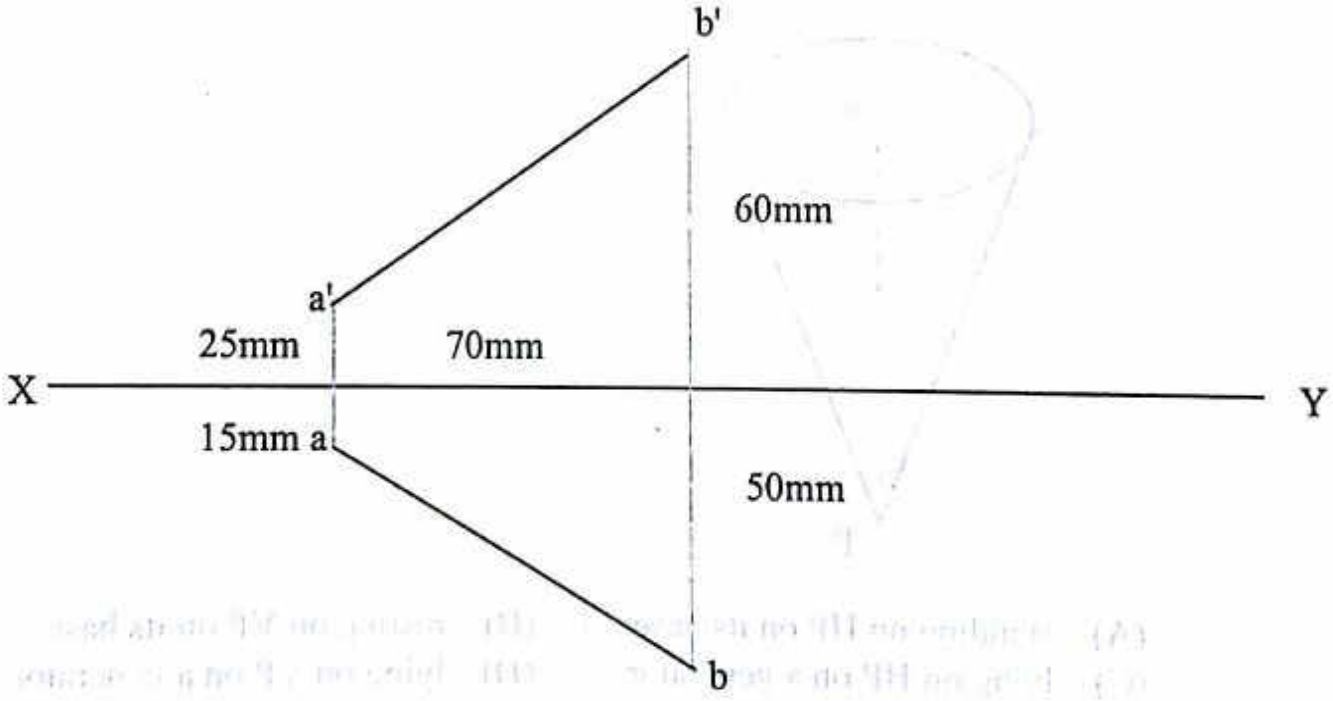
120. If the top view of a line crosses XY line,

(A) its front view must cross XY line
(B) front view will represent true length
(C) vertical trace will lie on the extension of the front view
(D) vertical trace will lie on the front view

121. If the front view of a line crosses XY line,

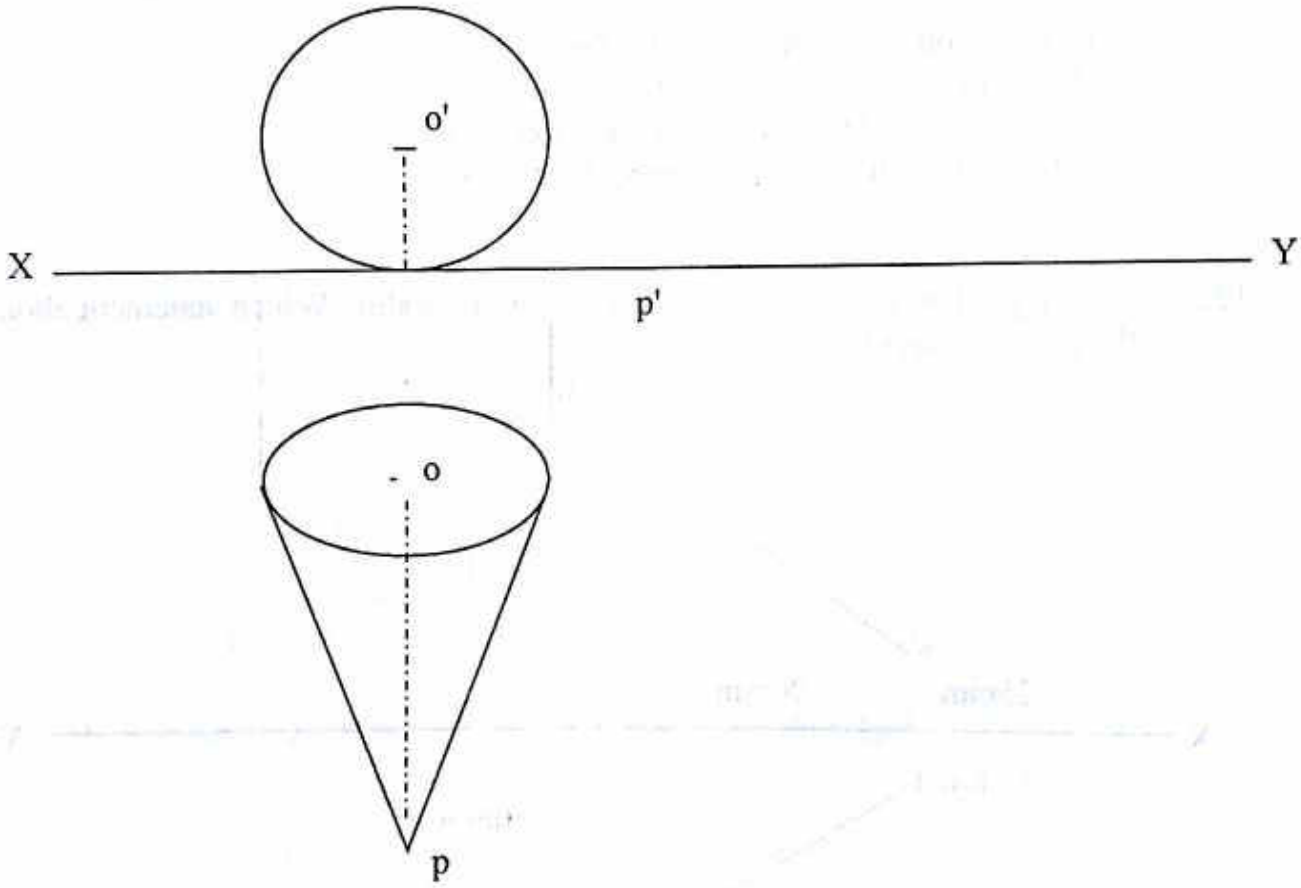
(A) its top view must cross XY line
(B) top view will represent true length
(C) horizontal trace will lie on the top view
(D) vertical trace will lie on the front view

122. The projections of a line are given here (not to scale). Which statement about the line is correct?



(A) Inclination of the line to HP is more than inclination to VP
(B) Inclination of the line to HP is less than inclination to VP
(C) Inclination to HP and VP are equal
(D) (Inclination to HP + Inclination to VP) = 90°

123. The drawings represent the top view and front view of a cone in I quadrant. The cone is



(A) standing on HP on its base
(B) resting on VP on its base
(C) lying on HP on a generator
(D) lying on VP on a generator

124. The drawings (as given in Question No.123) represent the top view and front view of a cone in I quadrant. How is its axis?

(A) Perpendicular to HP
(B) Perpendicular to VP
(C) Parallel to HP and VP
(D) Inclined to HP and VP

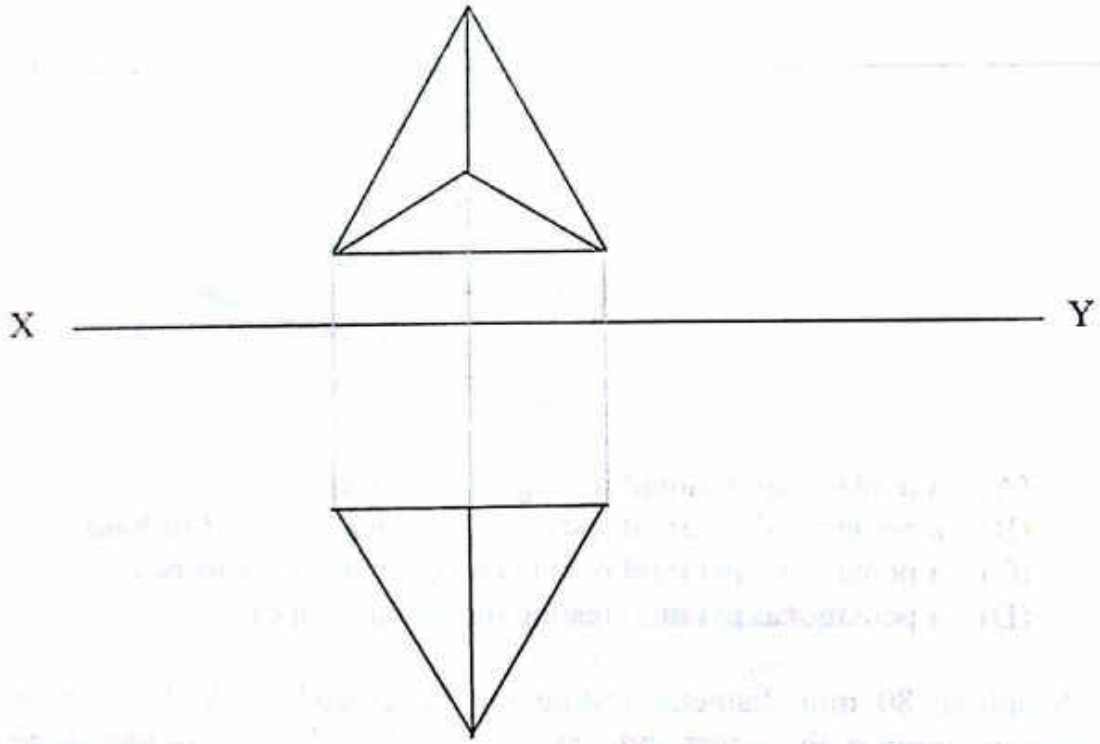
125. Four spheres of diameter "d" rest on the ground with each one touching the other two such that their centres lie at the corners of a square. What is the diameter of the sphere that can just remain in the gap (without falling down) formed by the four spheres?

(A) d
(B) d/2
(C) 0.414 d
(D) 1.414 d

126. A cylinder 50 mm diameter and 70 mm height stands on HP on a point of its base circle with the generator containing this point making 40° to HP and 35° to VP. What is the inclination of the axis to VP ?

(A) 40° (B) 35°
(C) <45° (D) >35°

127. Which statement is true for the following tetrahedron?

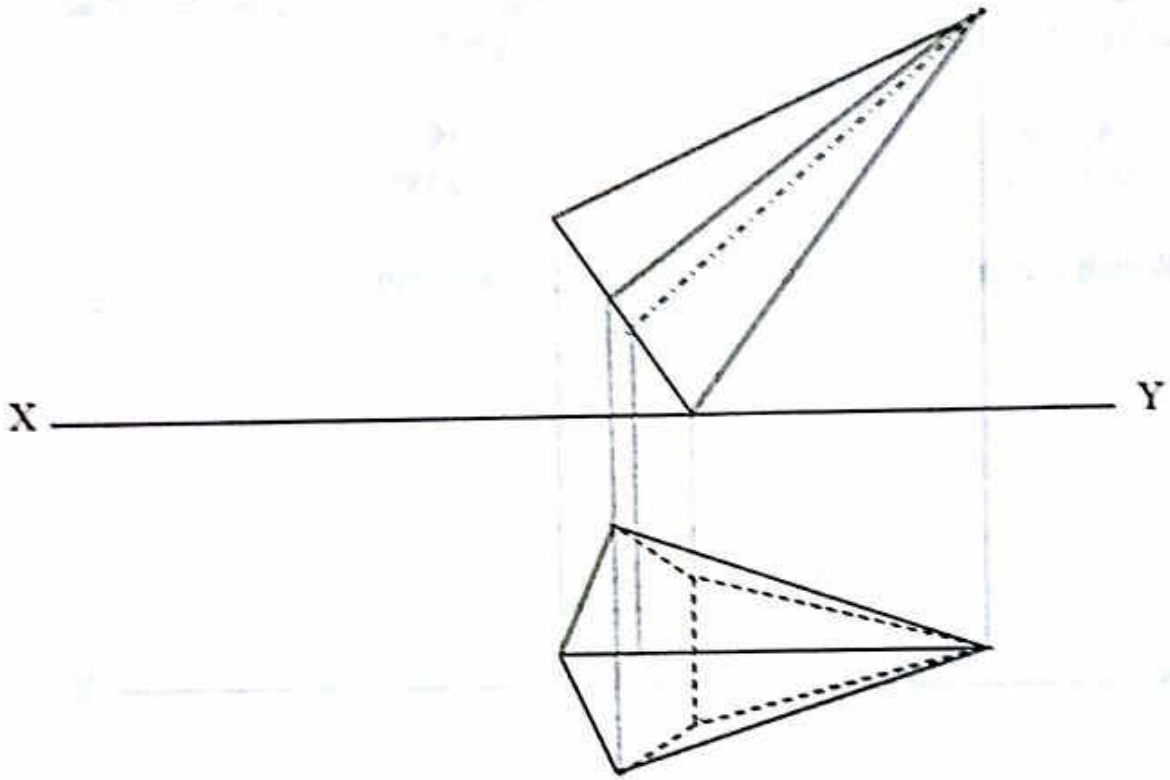


(A) One triangular face is parallel to HP
(B) One triangular face is parallel to VP
(C) Base is on VP
(D) Base is on HP

128. A cone 102 mm diameter and 100 mm axis is lying on HP on one of its generators which is perpendicular to VP. What is the inclination of the axis to HP?

(A) 30° (B) 60°
(C) 27° (D) 54°

129. The top and front views given below represent



(A) a pentagonal pyramid resting on HP on its base
(B) a pentagonal pyramid resting on HP on a corner of its base
(C) a pentagonal pyramid resting on HP on a side of its base
(D) a pentagonal pyramid resting on HP on its apex

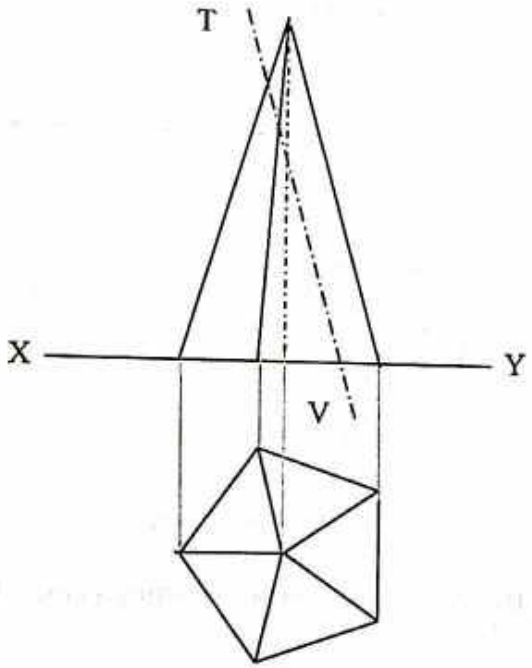
130. A sphere 80 mm diameter resting on the ground is cut by vertical plane passing through the centre and making 60^0 to VP. What is the true shape of cut surface?

(A) Circle 70 mm diameter
(B) Circle 60 mm diameter
(C) Circle 80 mm diameter
(D) None of the above

131. A cone 50 mm diameter and 70 mm axis length standing on HP on its base is cut by a plane parallel to an end generator. What is the true shape of section obtained?

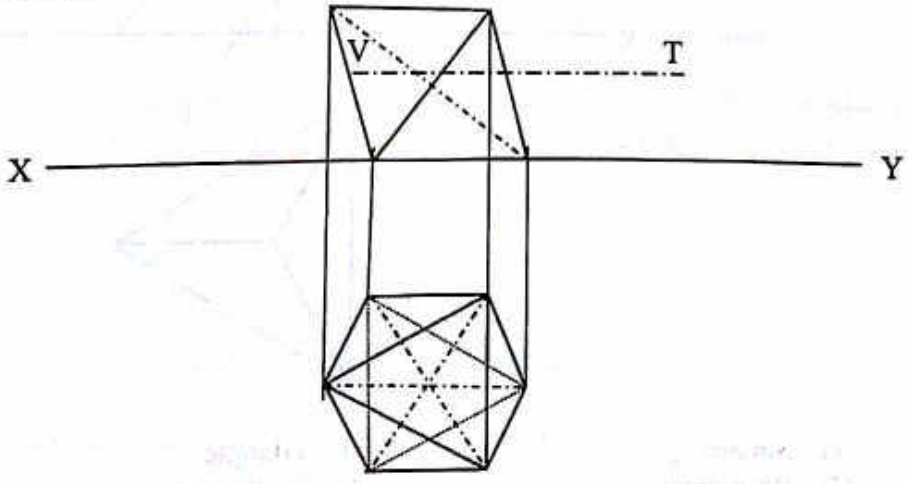
(A) Isosceles triangle
(B) Parabola
(C) Equilateral triangle
(D) Hyperbola

132. Front and top views of a pentagonal pyramid are given. When it is cut by a cutting plane shown, what is the true shape of section obtained?



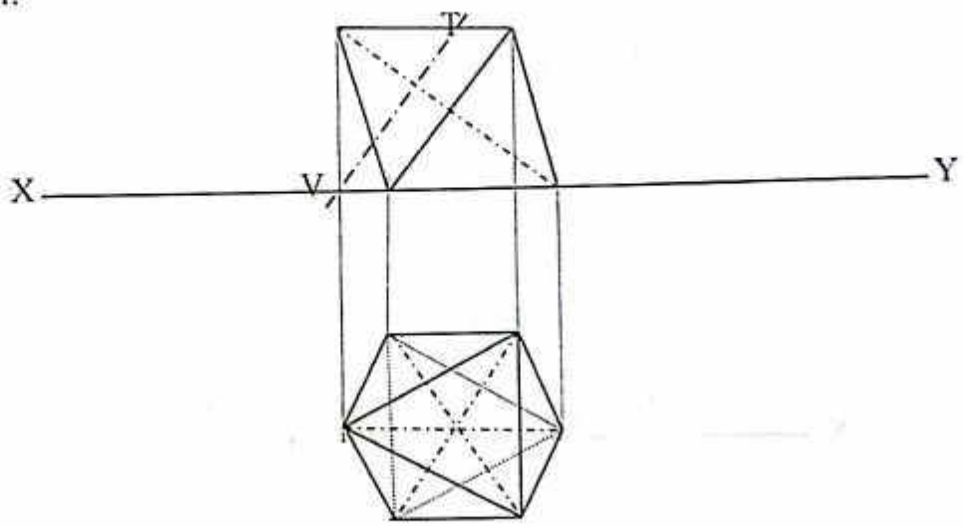
(A) Pentagon
(B) Rectangle
(C) Trapezium
(D) Hexagon

133. An octahedron is cut by a section plane as shown. What is the true shape of section?



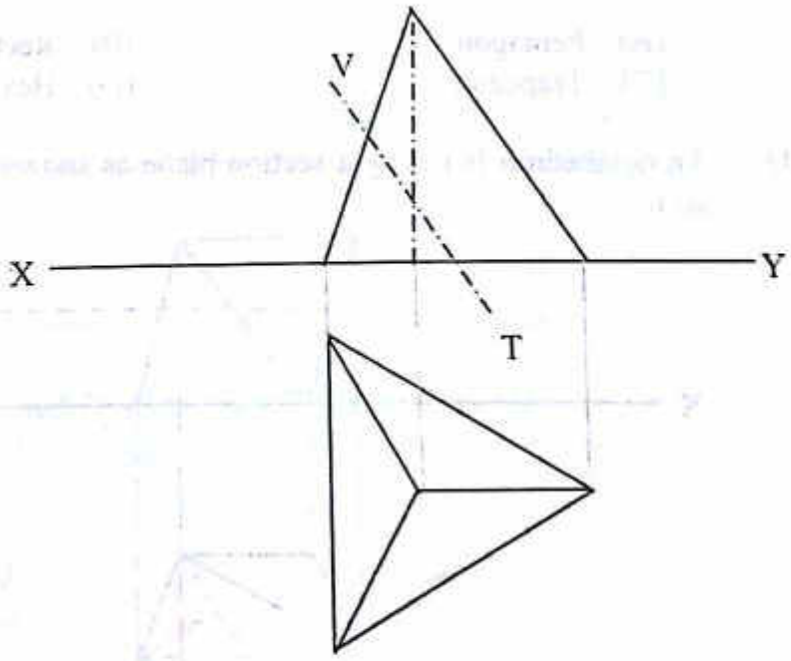
(A) Triangle
(B) Square
(C) Hexagon
(D) Rhombus

134. An octahedron is cut by a section plane as shown. What is the true shape of section?



(A) Triangle
(B) Square
(C) Hexagon
(D) Pentagon

135. A tetrahedron resting on HP as shown is cut by a cutting plane. What is the true shape of section?



(A) Square
(B) Triangle
(C) Rhombus
(D) Parallelogram

136. Which cutting plane can give the biggest possible triangular true shape when a pentagonal pyramid is cut?

(A) Cutting plane should contain the axis
(B) Cutting plane should be perpendicular to the base
(C) Cutting plane should pass through the apex and two corners of base
(D) Cutting plane should pass through the apex and slant edge

137. Perspective views of lines that are parallel to ground plane

(A) will be parallel to ground line
(B) need not be parallel to ground line
(C) will be parallel to each other
(D) will lie on ground line

138. An equilateral triangle 50 mm side lies on ground plane with one side on picture plane. The station point is 60 mm in front of picture plane, 70 mm above ground plane and the central plane passes through the centre of the triangle. What is the shape of its perspective view?

(A) scalene triangle
(B) equilateral triangle
(C) a line
(D) isosceles triangle

139. Horizon plane in perspective projection is

(A) a plane passing through the axis of solid
(B) a plane passing through the eye parallel to ground plane
(C) a plane passing through the eye perpendicular to ground plane
(D) a plane passing through the horizontal axis of solid

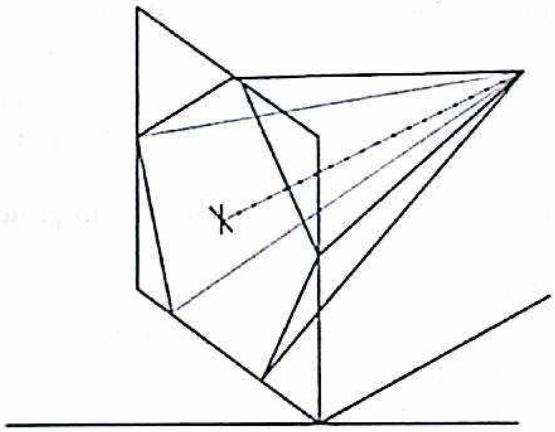
140. When height of observer is equal to the height of the cylinder which is standing on its base on ground plane, what is the shape of the perspective view of the top circular face?

(A) a line
(B) a point
(C) an ellipse which is fully visible
(D) an ellipse which is partially visible

141. Isometric projection of a sphere with radius "R" is

(A) an ellipse with major axis 2R
(B) an ellipse with major axis R
(C) a circle of radius R
(D) a circle of radius (R×0.816)

142. Isometric view of a pentagonal pyramid is 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

143. Isometric projection of a circle of 80 mm diameter is an ellipse with

(A) 40 mm minor axis
(B) 80 mm major axis
(C) (80 × 0.815) mm major axis
(D) (80/0.8915) mm major axis

144. A length of 2.5 km is represented by 10 mm in a drawing. What is the scale?

(A) 10 : 2.5
(B) 25 : 100
(C) 1 : 250000
(D) 1 : 2500

145. In a diagonal scale, the unit on the left side is meter. The height is divided into 20 equal parts and marked 0, 5, 10, 15, 20, ... up to 100. What is the smallest distance that can be represented on this scale ?

(A) 1 decimeter
(B) 1 centimeter
(C) 5 decimeter
(D) 5 centimeter

146. 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

147. The foci of an ellipse are 80 mm apart and its major axis is 100 mm. What is the length of its minor axis?

(A) 60 mm
(B) 20 mm
(C) 50 mm
(D) 70 mm

148. A ball is thrown from the ground and it just passes over a tree 5 m tall and falls to the ground tracing a parabolic path. The focus of the curve is on the ground itself. What is the size of the rectangle in which the curve can be drawn?

(A) 5m × 5m
(B) 5m × 10m
(C) 5m × 20m
(D) 5m × 25m

149. Length of transverse axis of a hyperbola is

(A) distance between the vertices
(B) distance between the foci
(C) radius of outer auxiliary circle
(D) distance between vertex and centre

150. The curve satisfying Boyle's Law is a

(A) rectangular hyperbola
(B) parabola
(C) cycloid
(D) hyperbola

GENERAL ENGINEERING

151. Good quality of cement contains higher percentage of

(A) tricalcium silicate
(B) di-calcium silicate
(C) tricalcium aluminate
(D) tetra calcium alumino ferrite

152. Concrete slump recommended for beams and slabs is

(A) 25-50mm
(B) 25-75mm
(C) 30-125mm
(D) 50-100mm

153. The foundation in which beam is provided to join two footings is known as

(A) strip footing
(B) strap footing
(C) combined footing
(D) raft footing

154. Portland pozzolana cement possess

(A) higher resistance to chemical attack
(B) lower heat of hydration
(C) lower shrinkage on drying
(D) All of the above

155. A 1st class brick immersed in water for 24 hours, should not absorb water (by weight) more than

(A) 10%
(B) 15%
(C) 20%
(D) 25%

156. The type of bond in which every course contains both headers and stretchers is called

(A) English bond
(B) Flemish bond
(C) Mixed bond
(D) Russian bond

157. The back staff reading on a bench mark of RL 200.00 m is 2.685m. If foresight reading on a point is 1.345m, the reduced level of the point is

(A) 202.685
(B) 201.345
(C) 201.340
(D) 204.030

158. A relatively fixed point of known elevation above datum is called

(A) bench mark
(B) datum line
(C) reduced level
(D) reference point

159. Surveys which are carried out to provide a national grid of control for preparation of accurate maps of large areas are known as

(A) plane surveys
(B) geodetic surveys
(C) geographical surveys
(D) topographical surveys

160. An imaginary line joining the points of equal elevation on the surface of the Earth represents

(A) contour surface
(B) contour gradient
(C) contour line
(D) level line

161. Which of the following is an intensive property of a thermodynamic system?

(A) Volume
(B) Temperature
(C) Mass
(D) Energy

162. The value of 1 bar in SI unit is equal to

(A) $100N/m^2$
(B) $1\times10^4\ N/m^2$
(C) $1\times10^5 N/m^2$
(D) $1\times10^6 N/m2$

163. The specific volume of water when heated at 0^oC

(A) first increases and then decreases
(B) first decreases and then increases
(C) increases steadily
(D) decreases steadily

164. Work done in a free expansion process is

(A) zero
(B) minimum
(C) positive
(D) negative

165. In SI unit the value of the Universal Gas constant is

(A) 8.314 J/mol/K
(B) 83.14 J/mol/K
(C) 831.4 J/mol/K
(D) 8314 J/mol/K

166. In a reversible cycle, the entropy of the system

(A) increases
(B) decreases
(C) does not change
(D) first increases and then decreases

167. Rankine cycle efficiency of a good steam power plant may be in the range of

(A) 15 to 20%
(B) 35 to 45%
(C) 70 to 80%
(D) 90 to 95%

168. For the same compression ratio,

(A) thermal efficiency of Otto cycle is greater than that of Diesel cycle
(B) thermal efficiency of Otto cycle is less than that of Diesel cycle
(C) thermal efficiency of Otto cycle is the same as that of Diesel cycle
(D) None of the above.

169. With increase in pressure,

(A) enthalpy of dry saturated steam increases
(B) enthalpy of dry saturated steam decreases
(C) enthalpy of dry saturated steam remains the same
(D) enthalpy of dry saturated steam first increases then decreases

170. In an iso-thermal process,

(A) temperature increases gradually
(B) volume remains constant
(C) pressure remains constant
(D) change in internal energy is zero

171. The unit of Electric flux is

(A) weber
(B) tesla
(C) coulomb
(D) volt

172. The time period of free oscillations in a galvanometer having a relative damping of 0.6 is 2 seconds. The frequency of damped oscillations is

(A) 0.5 rad/s
(B) 0.4 rad/s
(C) 0.3 rad/s
(D) None of the above

173. Moving iron voltmeters indicate

(A) the same value for DC and AC voltages
(B) lower values for AC voltages than that for corresponding DC voltages
(C) higher values for AC voltages than that for corresponding DC voltages
(D) None of the above

174. When a voltage of 400 sin 314t is applied to a resistive load of 10 Ω, the current is

(A) 40A
(B) 4A
(C) 28A
(D) 56A

175. A series circuit consisting of two elements has the following current and voltage relations

$i=4\cos(2000t+11.32^\circ)A$

$v=200\sin(2000t+50^\circ)v$

The circuit elements are

(A) resistance and capacitance
(B) resistance and inductance
(C) capacitance and inductance
(D) both resistances

176. What is the phase angle of a series RLC circuit at resonance?

(A) 1°
(B) 0°
(C) 90°
(D) 30°

177. The power input to a 3 phase star connected resistive load drawing a current of 5A from a 400V 50Hz 3 phase AC supply is

(A) 2000 w
(B) 6000 w
(C) zero
(D) 3465 w

178. To which component in a RC circuit is the power dissipation due?

(A) resistance
(B) capacitance
(C) Both (A) and (B)
(D) None of the above

179. Power in a 3 phase 4 wire balanced system can be measured by

(A) 3 ammeters only
(B) 3 voltmeters only
(C) 1 wattmeter
(D) None of the above

180. Each branch of a 3 phase delta connected system contains resistances of 10 Ω. The branch resistances in an equivalent star connection is

(A) 6.67 Ω
(B) 10 Ω
(C) 3.33 Ω
(D) 30 Ω

181. The concentration of minority carriers in a semiconductor depends mainly on

(A) the extent of doping
(B) temperature
(C) the applied bias
(D) None of the above

182. When a p-n junction is reverse biased

(A) holes and electrons move away from the junction
(B) holes and electrons move towards the junction
(C) holes move towards and electrons move away from the junction
(D) electrons move towards and holes move away from the junction

183. LVDT is a

(A) pressure transducer
(B) displacement transducer
(C) velocity
(D) acceleration

184. The gauge factor of a metallic strain gauge is about

(A) 2
(B) 10
(C) 100
(D) 1000

185. A Darlington pair is used for

(A) low distortion
(B) high frequency range
(C) high power gain
(D) high current gain

186. The theoretical maximum efficiency of a half wave diode rectifier is

(A) 50%
(B) 81.2%
(C) 40.6%
(D) None of the above

187. If input frequency is 50 Hz, the frequency of output wave in a half wave diode rectifier circuit is

(A) 25 Hz
(B) 50 Hz
(C) 100 Hz
(D) 200 Hz

188. If the carrier of a 100% modulated AM wave is suppressed, the percentage of power saving will be

(A) 50
(B) 150
(C) 100
(D) 66.66

189. In an FM signal, the modulating frequency is 2 kHz and maximum deviation is 10 kHz. The bandwidth requirement is

(A) 2 kHz
(B) 10 kHz
(C) 5 kHz
(D) 32 kHz

190. The efficiency of a bridge rectifier is

(A) 0.406
(B) 0.812
(C) 1.21
(D) 1.11

191. Which technology is used in Compact disks?

(A) Mechanical
(B) Electrical
(C) Electro Magnetic
(D) Laser

192. C programming language was developed by

(A) Dennis Ritchie
(B) Ken Thompson
(C) Bill Gates
(D) Peter Norton

193. Which of the following is a Scalar Data type?

(A) Float
(B) Union
(C) Array
(D) Pointer

194. p++ executes faster than p+1 because

(A) p uses registers
(B) ++ is faster than +
(C) p++ is a single instruction
(D) None of the above

195. Header files in C contain

(A) compiler commands
(B) library functions
(C) header information of C programs
(D) operators for files

196. A function that calls itself for its processing is known as

(A) inline function
(B) nested function
(C) overloaded function
(D) recursive function

197. A multidimensional array can be expressed in terms of

(A) array without the group of contiguous array
(B) data type arrays
(C) array of pointers rather than as pointers to a group of contiguous array
(D) None of the above

198. Swapping

(A) works best with many small partitions
(B) allows many programs to use memory simultaneously
(C) allows each program in turn to use the memory
(D) does not work with overlaying

199. Computers attached to an Ethernet uses

(A) CDMA
(B) TDMA
(C) FDMA
(D) CSMA/CD

200. Which of the following cables can transmit data at high speeds?

(A) Coaxial Cable
(B) Optic Fiber Cable
(C) Twisted pair Cable
(D) UTP Cable

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