Each question carries four options namely A, B, C and D. Choose one correct option and mark in appropriate place in the OMR Answer Sheet.

1. Who was the Viceroy of India, when the Rowlatt Act was passed?
   A) Lord Irwin
   B) Lord Chelmsford
   C) Lord Wavell
   D) Lord Wellington.

2. Which one of the following is the softest?
   A) Sodium
   B) Aluminium
   C) Iron
   D) Lithium.
3. As a non-member who can participate in the proceedings of either of House of Parliament?

A) Vice-President  
B) Chief Justice
C) Attorney General  
D) Chief Election Commissioner.

4. Which is the river on which Indira Sagar Dam is planned to be constructed?

A) Mahanadi  
B) Godavari
C) Krishna  
D) Narmada.

5. The first astronomer who gave the idea, 'The earth rotates on its axis', is

A) Bhaskara  
B) Aryabhata
C) Varahamihira  
D) Kalpana Chawla.

6. Which one of the following angles cannot be constructed using an unmarked ruler and compass only?

A) 75°  
B) 90°
C) 50°  
D) 22\(\frac{1}{2}\)°.
7. For a Frequency Polygon, the points are plotted against
   A) mid-point of the class interval vs frequency
   B) lower limit of the class interval vs frequency
   C) upper limit of the class interval vs frequency
   D) real limit of the class interval vs frequency.

8. AICTE was established in
   A) November, 1945
   B) November, 1955
   C) November, 1985

9. One of the main publications of John Dewey is
   A) Secrets of Childhood
   B) Education Today
   C) Education of Man

10. According to David Ausubel, “Verbal Learning” is
    A) learning a new language
    B) oral practice
    C) understanding verbal information
    D) passive learning experience.
11. The Southern Regional Office of UGC is in
   A) Hyderabad  B) Bangalore
   C) Chennai  D) Mumbai.

12. National Population Policy was evolved in the year
   A) 1976  B) 1979

13. According to Abraham Maslow, 'Self-Actualisation' in the hierarchy is
   A) first step  B) final step
   C) third step  D) fourth step.

14. Who is the author of 'Emile'?  
   A) Dewey  B) Bertrand Russell
   C) Froebel  D) Rousseau.

15. The university that has no affiliated colleges is
   A) Madras University
   B) Madurai Kamaraj University
   C) Thanjavur Tamil University
   D) Manonmaniam Sundaranar University.
16. Human Rights Day is
   A) December 10       B) December 7
   C) December 26       D) July 17.

17. Which one of the following models is not on curriculum development?
   A) The Tylor model
   B) The Ausubel's model
   C) The Taba model
   D) The Hunkin's model.

18. The chief objective of pre-primary education is to promote ................. of the child.
   A) physical development
   B) mental development
   C) social development
   D) overall development.

19. If the teacher finds in learner's activities something new or original, then the child is supposed to be
   A) intelligent
   B) creative
   C) critical
   D) motivated.

A
20. Which one of the following is not a learning domain?

A) Cognitive domain  B) Psychomotor domain  
C) Physiological domain  D) Affective domain.

21. A particle is projected with a velocity of 24 m/sec at an angle of 30°. The time of flight is

A) \( \frac{24}{g} \)  B) \( \frac{12}{g} \)  
C) \( \frac{12}{g^2} \)  D) \( \frac{36}{g} \).

22. A stone is dropped into a well and reaches the bottom with a velocity 30 m/sec and the sound of the splash on the water reaches the top of the well in \( 3 \frac{182}{981} \) second from the time the stone starts. The velocity of sound =

A) 150 m/sec  B) 360 m/sec  
C) 260 m/sec  D) 300 m/sec.

A) 150 m/sec  B) 360 m/sec  
C) 260 m/sec  D) 300 m/sec.
23. If the greatest height attained by the particle is a quarter of its range on the horizontal plane, the angle of projection is
   A) 45°, B) 30°, C) 60°, D) 90°.

24. The horizontal range of a projectile is maximum when angle of projection is
   A) 60°, B) 90°, C) 45°, D) 30°.

25. If two velocities are equal in magnitude, then magnitude of resultant velocity is
   A) $2V\sin\frac{\alpha}{2}$, B) $2V\cos\frac{\alpha}{2}$, C) $2V^2\cos\frac{\alpha}{2}$, D) $V\cos\frac{\alpha}{2}$.

26. The acceleration component in the normal direction is
   A) $\frac{V}{r}$, B) $r\theta$, C) $\frac{r^2}{\rho}$, D) $r$.

| Turn over |
27. If $\mu$ is the coefficient of friction as the equilibrium is limiting, then

A) $\frac{F}{R} < \mu$  
B) $\frac{F}{R} = \mu$  
C) $F = \mu$  
D) $\frac{F}{R} > \mu$.

28. Two parallel forces $\vec{F}$ and $\vec{G}$ act at the points A and B, then their resultant $\vec{R}$ passes through a point C which divides $AB$ in the ratio

A) $2G : P$  
B) $G : 2P$  
C) $G : P$  
D) $P : G$.

29. If the resultant of two forces $3P$ and $5P$ is $7P$, the angle between the forces is

A) $30^\circ$  
B) $45^\circ$  
C) $60^\circ$  
D) $90^\circ$.

30. $G$ is the centroid of $\triangle ABC$ and $P$ is any point in the plane of the triangle. Then $\overline{PA} + \overline{PB} + \overline{PC} =$

A) $2 \overline{PG}$  
B) $\overline{PG}$  
C) $\overline{PA}$  
D) $3 \overline{PG}$.

A
G துறுப்பு ΔABC கள் ஆபத்திருந்தது. \( P \) புற்றுக்கொண்டு தளச்சின்னம் \( 2 \) களா நோக்கையும் புற்று எளியது, \( PA + PB + PC = \)

A) \( 2 \frac{PG}{2} \) \hspace{1cm} B) \( \frac{PG}{2} \)
C) \( \frac{PA}{2} \) \hspace{1cm} D) \( 3 \frac{PG}{2} \).

31. The singular points for \( f(z) = \frac{z + 1}{z^2 (z^2 + 1)} \) are

A) \( 0, i, -i \) \hspace{1cm} B) \( 0, i \)
C) \( 1, i, -i \) \hspace{1cm} D) \( 0, -i \).

\( f(z) = \frac{z + 1}{z^2 (z^2 + 1)} \) கான நெருப்பப்பற்றாக்கி (singular)

A) \( 0, i, -i \) \hspace{1cm} B) \( 0, i \)
C) \( 1, i, -i \) \hspace{1cm} D) \( 0, -i \).

32. Any two harmonic conjugates of a given harmonic function \( u(x, y) \) differ by

A) \( x \) \hspace{1cm} B) \( y \)
C) \( xy \) \hspace{1cm} D) constant.

\( \text{எதுருத்தும்} \quad u(x, y) \text{மாறு சாய் தொடருடன் நெரும்பொழுது} \text{சாய் சாய்ப்பொழுது} \text{ஒன்றுத்தும்} \)

A) \( x \) \hspace{1cm} B) \( y \)
C) \( xy \) \hspace{1cm} D) பொழுது.

33. The image of the circle \( |z - 3| = 3 \) under the map \( w = \frac{1}{z} \) is a

A) circle \hspace{1cm} B) straight line
C) square \hspace{1cm} D) rectangle.

\( w = \frac{1}{z} \text{எதுருத்து} \quad |z - 3| = 3 \text{எதுருத்து} \text{சாய் சாய்ப்பொழுது} \text{சாய் சாய்ப்பொழுது} \)

A) சாயும் \hspace{1cm} B) சாயும்
C) சாயும் \hspace{1cm} D) சாயும்.
34. The value of \( \int_C \frac{e^z}{z^n} \, dz \), where \( c \) is the circle \( |z| = 1 \), is

A) \( 2 \pi i \)  
B) \( 2 \pi \)  
C) \( \frac{2 \pi}{(n-1)!} \)  
D) \( \frac{2 \pi i}{(n-1)!} \).

35. The function \( f(z) = |z|^2 \) is

A) differentiable at \( z = 0 \)  
B) differentiable at \( z \neq 0 \)  
C) nowhere differentiable  
D) not harmonic.

36. If the function \( f(z) = \frac{z}{1+z} \), \( u(x, y) + iv(x, y) = \)

A) \( \frac{x}{x^2 + y^2} - \frac{iy}{x^2 + y^2} \)  
B) \( \frac{x^2 + x + y^2}{(x+1)^2 + y^2} + \frac{iy}{(x+1)^2 + y^2} \)  
C) \( (x^2 + 5) + i \cdot 7y \)  
D) \( \frac{x^2 + y^2}{(x+1)^2 + y^2} + \frac{iy}{(x+1)^2 + y^2} \).

\( f(z) = \frac{z}{1+z} \)  
\( u(x, y) + iv(x, y) = \)

A) \( \frac{x}{x^2 + y^2} - \frac{iy}{x^2 + y^2} \)  
B) \( \frac{x^2 + x + y^2}{(x+1)^2 + y^2} + \frac{iy}{(x+1)^2 + y^2} \)  
C) \( (x^2 + 5) + i \cdot 7y \)  
D) \( \frac{x^2 + y^2}{(x+1)^2 + y^2} + \frac{iy}{(x+1)^2 + y^2} \).
37. \[ \sum \frac{(-1)^{n-1} x^n}{n} \] converges if

A) \(|x| < 1\)  
B) \(|x| = 0\)  
C) \(|x| > 1\)  
D) \(|x| \geq 1\).

38. The series \[ \sum \frac{(-1)^n}{n^p} \] is absolutely convergent if

A) \(p > 1\)  
B) \(p < 1\)  
C) \(p = 1\)  
D) \(p < 0\).

39. The sequence \(((-1)^n)\)

A) is convergent  
B) oscillates  
C) is not convergent  
D) is monotonic.

\(((-1)^n)\) நேர்ப்பெருக்கு

A) நேர்ப்பெருக்கு  
B) வழிநிலை  
C) வேறுபட்டு  
D) வேறுபட்படை

40. The value of \[ \lim_{n \to \infty} \frac{1^2 + 2^2 + ... + n^2}{n^3} \] is

A) \(\infty\)  
B) 0  
C) \(\frac{1}{2}\)  
D) \(\frac{1}{3}\).

\[ \lim_{n \to \infty} \frac{1^2 + 2^2 + ... + n^2}{n^3} \] நேர்ப்பெருக்கு =

A) \(\infty\)  
B) 0  
C) \(\frac{1}{2}\)  
D) \(\frac{1}{3}\).
41. The incorrect statement from the following is

A) \( N \) is countable set
B) \( \mathbb{Q} \) is countable set
C) \( \mathbb{Q}^c \) is countable set
D) \( \mathbb{Z} \) is countable set.

42. In \( \mathbb{R} \) with usual metric, the incorrect statement is

A) \( (0, 1) \) is an open set
B) \( \{0\} \) is an open set
C) \( (0, \infty) \) is an open set
D) \( (-\infty, 0) \) is an open set.

43. Which one of the following is a vector space? \( \mathbb{R} \times \mathbb{R} \) with usual addition and scalar multiplication defined by

A) \( \alpha (a, b) = (0, \alpha b) \)
B) \( \alpha (a, b) = (\alpha a, \alpha^2 b) \)
C) \( \alpha (a, b) = (\alpha a, \alpha b) \)
D) \( \alpha (a, b) = (|\alpha| a, |\alpha| b) \)

44. If \( A \) and \( B \) are two subspaces of a vector space \( V \) over a field \( F \), then

A) \( A \cup B \) is a subspace of \( V \)
B) \( A \times B \) is a subspace of \( V \)
C) \( A \cap B \) is a subspace of \( V \)
D) \( AB \) is a subspace of \( V \).

A, B \( \subseteq \mathbb{F} \) \( \text{நிர்மல செயல்பாடு மிக்கன்} \) \( \text{மெடிக்} \) \( \text{முழுக்கள்} \) \( V \) \( \text{சாய்வாயிகள்} \) \( \text{சாய்வாயிகள்} \)

A) \( A \cup B, V \)-ஊக்கான்பாடு
B) \( A \times B, V \)-ஊக்கான்பாடு
C) \( A \cap B, V \)-ஊக்கான்பாடு
D) \( AB, V \)-ஊக்கான்பாடு.

A
45. If $A$ and $B$ are subgroups of an Abelian group $G$, then

A) $A \cup B$ is a subgroup of $G$

B) $A \times B$ is a subgroup of $G$

C) $AB$ is a subgroup of $G$

D) $A \ast B$ is a subgroup of $G$.

46. If $H$ is a subgroup of $G$ and $N$ is a normal subgroup of $G$, then

A) $HN$ is a subgroup of $G$

B) $H$ is a normal subgroup of $G$

C) $H \cap N$ is a normal subgroup of $G$

D) $H \cup N$ is a normal subgroup of $G$.

47. The angle between the planes $2x - y + z = 6$ and $x + y + 2z = 7$ is

A) $60^\circ$

B) $90^\circ$

C) $30^\circ$

D) $0^\circ$.

$2x - y + z = 6$ மேலில் $x + y + 2z = 7$க்கும் இடைப்பால் கோட்டெடுப்பு கோணம்

A) $60^\circ$

B) $90^\circ$

C) $30^\circ$

D) $0^\circ$. 

A
48. \( G = \left\{ \begin{pmatrix} x & x \\ x & x \end{pmatrix} \mid x \in \mathbb{R}^* \right\} \) is a group under matrix multiplication. The identity element of \( G \) is

A) \( \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \)  
B) \( \begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix} \)  
C) \( \begin{pmatrix} \frac{1}{4} & \frac{1}{4} \\ \frac{1}{4} & \frac{1}{4} \end{pmatrix} \)  
D) \( \begin{pmatrix} \frac{x}{2} & \frac{x}{2} \\ \frac{x}{2} & \frac{x}{2} \end{pmatrix} \)

49. The equation of the sphere which has the line joining the points \((2, 7, 5)\) and \((8, -5, 1)\) as diameter is

A) \( x^2 + y^2 + z^2 + 10x - 5 = 0 \)  
B) \( x^2 + y^2 + z^2 - 10x - 2y - 6z - 14 = 0 \)  
C) \( x^2 + y^2 + z^2 - 2y - 6z = 0 \)  
D) \( x + y + z = 0. \)
50. The point of intersection of the line \( \frac{x-1}{2} = \frac{y-2}{-3} = \frac{z+3}{4} \) with the plane \( 2x + 4y - z + 1 = 0 \) is

\[ \text{A)} \left( \frac{10}{3}, \frac{-3}{2}, \frac{5}{3} \right) \quad \text{B)} \left( \frac{20}{7}, \frac{17}{2}, \frac{-2}{3} \right) \]

\[ \text{C)} \left( 2, -3, 4 \right) \quad \text{D)} \left( 1, 2, 3 \right). \]

51. If \( \vec{f} = \left( x^2 + y^2 \right) \hat{i} + \left( x^2 - y^2 \right) \hat{j} \) along the curve \( y = x^2 \), the value of \( \int_{0}^{1} \vec{f} \cdot d\vec{r} = \)

\[ \text{A)} 5 \quad \text{B)} \frac{9}{10} \]

\[ \text{C)} \frac{7}{10} \quad \text{D)} \frac{3}{10}. \]

52. The unit normal to the surface \( x^3 - xyz + z^3 = 1 \) at \( (1, 1, 1) \) is

\[ \text{A)} \frac{2\hat{i} + 2\hat{k}}{3} \quad \text{B)} \hat{i} + 2\hat{j} \]

\[ \text{C)} \hat{k} \quad \text{D)} \frac{2\hat{i} - \hat{j} + 2\hat{k}}{3}. \]

\[ \text{A} \]
\[ x^3 - xyz + z^3 = 1 \text{ என்று பொருளியது} \{1, 1, 1\} \text{என்ற புள்ளிகளில் வலவுக்கு உள்ளது} \]

A) \[ \frac{2\hat{i} + 2\hat{k}}{3} \]
B) \[ \hat{i} + 2\hat{j} \]
C) \[ \hat{k} \]
D) \[ \frac{2\hat{i} - \hat{j} + 2\hat{k}}{3} \]

53. \[ L\left(x^n\right) = \]
A) \[ \frac{\Gamma(n+1)}{s^{n+1}} \]
B) \[ \frac{\Gamma(n)}{s^n} \]
C) \[ \frac{\Gamma(n+1)}{s^n} \]
D) \[ \frac{\Gamma(n-1)}{s^{n-1}} \]

54. If \( L(f(x)) = F(s) \), then \( L(f(ax)) = \)
A) \[ F\left(\frac{s}{a}\right) \]
B) \[ aF\left(\frac{s}{a}\right) \]
C) \[ F(s + a) \]
D) \[ \frac{1}{a} F\left(\frac{s}{a}\right) \]

\[ L(f(x)) = F(s) \text{ என்று} \ L(f(ax)) = \]
A) \[ F\left(\frac{s}{a}\right) \]
B) \[ aF\left(\frac{s}{a}\right) \]
C) \[ F(s + a) \]
D) \[ \frac{1}{a} F\left(\frac{s}{a}\right) \]

55. The particular solution of \( \left(D^2 - 4\right)y = e^{2x} + e^{-4x} \) is
A) \[ y = \frac{x e^{2x}}{4} + \frac{e^{-4x}}{12} \]
B) \[ y = \frac{e^{x}}{4} + \frac{e^{-4x}}{12} \]
C) \[ y = e^{x} + e^{-4x} \]
D) \[ y = \frac{e^{-x}}{5} \]

\[ \left(D^2 - 4\right)y = e^{2x} + e^{-4x} \text{ என்று தீர்மானமானது} \]
A) \[ y = \frac{x e^{2x}}{4} + \frac{e^{-4x}}{12} \]
B) \[ y = \frac{e^{x}}{4} + \frac{e^{-4x}}{12} \]
C) \[ y = e^{x} + e^{-4x} \]
D) \[ y = \frac{e^{-x}}{5} \]
56. The equation \( Pdx + Qdy + Rdz = 0 \) is integrable if

A) \( P \left( \frac{\partial Q}{\partial y} - \frac{\partial R}{\partial x} \right) + Q \left( \frac{\partial R}{\partial y} - \frac{\partial P}{\partial z} \right) + R \left( \frac{\partial P}{\partial y} - \frac{\partial Q}{\partial x} \right) = 0 \)

B) \( P \left( \frac{\partial Q}{\partial z} - \frac{\partial R}{\partial y} \right) + Q \left( \frac{\partial R}{\partial z} - \frac{\partial P}{\partial x} \right) + R \left( \frac{\partial P}{\partial z} - \frac{\partial Q}{\partial y} \right) = 0 \)

C) \( P \left( \frac{\partial Q}{\partial x} - \frac{\partial R}{\partial y} \right) + Q \left( \frac{\partial R}{\partial x} - \frac{\partial P}{\partial z} \right) + R \left( \frac{\partial P}{\partial x} - \frac{\partial Q}{\partial y} \right) = 0 \)

D) \( P \left( \frac{\partial Q}{\partial z} - \frac{\partial P}{\partial y} \right) - Q \left( \frac{\partial R}{\partial x} - \frac{\partial P}{\partial z} \right) - R \left( \frac{\partial P}{\partial z} - \frac{\partial Q}{\partial x} \right) = 0 \)

57. Solution of \( p^2 - 9p + 18 = 0 \) is

A) \((y - 3x)(y - x) = 0\)

B) \((y + x + c)(y - 3x + c) = 0\)

C) \(y - 6x - c = 0\)

D) \((y - 6x - c)(y - 3x - c) = 0\).

58. The general solution of \( \left( D^2 - 5D + 6 \right) y = 0 \) is

A) \( y = C_1 e^{3x} + C_2 e^x \)

B) \( y = C_1 e^{2x} + C_2 \)

C) \( y = C_1 e^{3x} + C_2 e^{2x} \)

D) \( y = C_1 e^{x} + e^{2x} \cdot C_2 \).

A) \( y = C_1 e^{3x} + C_2 e^x \)

B) \( y = C_1 e^{2x} + C_2 \)

C) \( y = C_1 e^{3x} + C_2 e^{2x} \)

D) \( y = C_1 e^{x} + e^{2x} \cdot C_2 \).
59. The value of \( \int_{0}^{\pi/2} \sin^6 x \, dx = \) 

A) \( \frac{5\pi}{32} \)  
B) \( \frac{\pi}{32} \)  
C) \( 2\pi \)  
D) \( \frac{\pi}{2} \).

\( \int_{0}^{\pi/2} \sin^6 x \, dx = \) 

A) \( \frac{5\pi}{32} \)  
B) \( \frac{\pi}{32} \)  
C) \( 2\pi \)  
D) \( \frac{\pi}{2} \).

60. The value of \( \int_{0}^{\pi/2} \sin^6 x \cos^5 x \, dx = \) 

A) \( \frac{8}{406} \)  
B) \( \frac{\pi}{2} \)  
C) \( \frac{8}{693} \)  
D) \( \frac{5\pi}{32} \).

\( \int_{0}^{\pi/2} \sin^6 x \cos^5 x \, dx = \) 

A) \( \frac{8}{406} \)  
B) \( \frac{\pi}{2} \)  
C) \( \frac{8}{693} \)  
D) \( \frac{5\pi}{32} \).

61. The radius of curvature for \( y = e^x \) at the point where it crosses the y-axis is 

A) \( 4\sqrt{2} \)  
B) \( 2 \)  
C) \( 2\sqrt{2} \)  
D) \( \sqrt{2} \).

\( y = e^x \) അതെ മാത്രമേ നീ്നുന്ന നീൿൿരീ മുപ്പെട്ടു ഉണ്ടാക്കുന്ന സ്ഥലത്താണ്‌ സൂത്രം

A) \( 4\sqrt{2} \)  
B) \( 2 \)  
C) \( 2\sqrt{2} \)  
D) \( \sqrt{2} \).
62. The $n^{th}$ differential coefficient of $xe^x$ is

A) $e^x \cdot n$  
B) $e^x (n + x)$

C) $xe^x$  
D) $e^x$.

$xe^x$ சியை $n^{th}$ மூலகம்

A) $e^x \cdot n$  
B) $e^x (n + x)$

C) $xe^x$  
D) $e^x$.

63. The Rolle's constant for the function $f(x) = x^2$ in $[-1, 1]$ is

A) 0  
B) $-1$

C) $+1$  
D) $\frac{1}{\sqrt{3}}$.

$[-1, 1]$ - இ $f(x) = x^2$ என்பது $f'(x)$ எதிர்பருவம் பாதுகாப்பு

A) 0  
B) $-1$

C) $+1$  
D) $\frac{1}{\sqrt{3}}$.

64. The maximum value of the function $f(x) = x^3 - 9x^2 + 15x$ is

A) 7  
B) 10

C) 5  
D) 1.

$f(x) = x^3 - 9x^2 + 15x$ என்பது $f'(x)$ எதிர்பருவம் பாதுகாப்பு

A) 7  
B) 10

C) 5  
D) 1.

65. The values of $(-1)^{1/10} =$

A) $\cos \frac{2k\pi}{10} + i \sin \frac{2k\pi}{10}$, $k = 1 \ldots 9$

B) $\cos \frac{k\pi}{10} + i \sin \frac{k\pi}{10}$, $k = 1 \ldots 9$

C) $\cos \frac{(k+1)\pi}{10} + i \sin \frac{(k+1)\pi}{10}$, $k = 1 \ldots 9$

D) $\cos \frac{(2k+1)\pi}{10} + i \sin \frac{(2k+1)\pi}{10}$, $k = 1 \ldots 9$.  

A

[ Turn over
\((-1)^{1/10}\) ெ நடுவுப்பிட்டின்

A) \(\cos \frac{2k\pi}{10} + i \sin \frac{2k\pi}{10}, \quad k = 1 \ldots 9\)

B) \(\cos \frac{k\pi}{10} + i \sin \frac{k\pi}{10}, \quad k = 1 \ldots 9\)

C) \(\cos \frac{(k+1)\pi}{10} + i \sin \frac{(k+1)\pi}{10}, \quad k = 1 \ldots 9\)

D) \(\cos \frac{(2k+1)\pi}{10} + i \sin \frac{(2k+1)\pi}{10}, \quad k = 1 \ldots 9\).

66. \(\tan 4\theta =\)

A) \(\frac{4 \tan \theta + 4 \tan^2 \theta}{1 - 6 \tan^2 \theta + \tan^4 \theta}\)  
B) \(\frac{4 \tan \theta - 4 \tan^2 \theta}{1 - 6 \tan^2 \theta + \tan^4 \theta}\)

C) \(\frac{4 \tan^2 \theta}{1 - \tan^4 \theta}\)  
D) \(\frac{4 \tan^2 \theta}{1 + \tan^4 \theta}\).

\(\tan 4\theta =\)

A) \(\frac{4 \tan \theta + 4 \tan^2 \theta}{1 - 6 \tan^2 \theta + \tan^4 \theta}\)  
B) \(\frac{4 \tan \theta - 4 \tan^2 \theta}{1 - 6 \tan^2 \theta + \tan^4 \theta}\)

C) \(\frac{4 \tan^2 \theta}{1 - \tan^4 \theta}\)  
D) \(\frac{4 \tan^2 \theta}{1 + \tan^4 \theta}\).

67. With usual notations if a pair of conjugate diameters meet the hyperbola and its conjugate in \(P\) and \(D\), then \(CP^2 - CD^2 =\)

A) \(a^2 - b^2\)  
B) \(a^2 + b^2\)

C) \(a^2 b^2\)  
D) \(\sqrt{a^2 - b^2}\).

68. The perpendicular line to \(p = r \cos (\theta - \alpha)\) is \(p' =\)

A) \(r \cos (\alpha - \theta)\)  
B) \(r \cos \left(\frac{\pi}{4} + \alpha - \theta\right)\)

C) \(r \sin \left(\frac{\pi}{2} + \theta - \alpha\right)\)  
D) \(r \cos \left(\frac{\pi}{2} + \theta - \alpha\right)\).
\[ p = r \cos (\theta - \alpha) \]

A) \( r \cos (\alpha - \theta) \)

B) \( r \cos \left( \frac{\pi}{4} + \alpha - \theta \right) \)

C) \( r \sin \left( \frac{\pi}{2} + \theta - \alpha \right) \)

D) \( r \cos \left( \frac{\pi}{2} + \theta - \alpha \right) \).

69. The locus of the poles of chords of a parabola subtending a right angle at the vertex is

A) \( x + 2a = 0 \)

B) \( x + a = 0 \)

C) \( x - a = 0 \)

D) \( x + 4a = 0 \).

70. The lines \( y = mx \) and \( y = m_1x \) are conjugate diameters of the ellipse

\[ \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \] if \( mm_1 = \)

A) \( \frac{b^2}{a^2} \)

B) \( -\frac{b^2}{a^2} \)

C) \( \frac{a^2}{b^2} \)

D) \( -\frac{a^2}{b^2} \).

71. The characteristic roots of the matrix

\[
\begin{pmatrix}
\cos \theta & -\sin \theta \\
-\sin \theta & -\cos \theta
\end{pmatrix}
\]

are

A) \( 1, 0 \)

B) \( 0, -1 \)

C) \( 1, -1 \)

D) \( 2, -1 \).
\[
\begin{pmatrix}
\cos \theta & -\sin \theta \\
-\sin \theta & -\cos \theta
\end{pmatrix}
\]

A) 1, 0  
B) 0, -1  
C) 1, -1  
D) 2, -1.

72. A unitary matrix is

A) \[
\begin{pmatrix}
0 & i \\
0 & 0
\end{pmatrix}
\]

B) \[
\begin{pmatrix}
0 & -i \\
0 & 0
\end{pmatrix}
\]

C) \[
\begin{pmatrix}
1 & 1 \\
1 & 1
\end{pmatrix}
\]

D) \[
\begin{pmatrix}
0 & -i \\
i & 0
\end{pmatrix}
\]

73. Sum of the series \( \log_3 e - \log_9 e + \log_{27} e - \log_{81} e + \ldots \) is

A) \( \log_e 2 \)  
B) \( \log_e 3 \)  
C) \( \frac{\log_e 2}{\log_e 3} \)  
D) \( \frac{\log_e 3}{\log_e 2} \).

74. If \( X \) is large, nearly \( \sqrt{X^2 + 16} - \sqrt{X^2 + 9} = \)

A) \( \frac{1}{2X} \)  
B) \( \frac{3}{2X} \)  
C) \( \frac{7}{4X} \)  
D) \( \frac{7}{2X} \).
X மற்றும் யாதும் சாதி, என்னுடையது \[ \sqrt{X^2 + 16} - \sqrt{X^2 + 9} = \]

A) \( \frac{1}{2X} \)  
B) \( \frac{3}{2X} \)  
C) \( \frac{7}{4X} \)  
D) \( \frac{7}{2X} \).

75. The coefficient of \( x^n \) in the series

\[ 1 + \frac{b + ax}{1!} + \frac{(b + ax)^2}{2!} + \ldots \]

is

A) \( \frac{e^b a^n}{n!} \)  
B) \( \frac{a^n}{n!} \)  
C) \( a^n \)  
D) \( \frac{e^b}{n!} \).

1 + \( \frac{b + ax}{1!} + \frac{(b + ax)^2}{2!} + \ldots \) என்பது \( x^n \) கான்க

A) \( \frac{e^b a^n}{n!} \)  
B) \( \frac{a^n}{n!} \)  
C) \( a^n \)  
D) \( \frac{e^b}{n!} \).

76. If \( p \) is a prime and \( p / a^2 + b^2 \) and \( p / b^2 + c^2 \), then

A) \( p / a^2 \)  
B) \( p / c^2 \)  
C) \( p / a^2 + c^2 \)  
D) \( p / a^2 - c^2 \).

\( p \) என்பது வளை, \( p / a^2 + b^2 \) மற்றும் \( p / b^2 + c^2 \) சாதி

A) \( p / a^2 \)  
B) \( p / c^2 \)  
C) \( p / a^2 + c^2 \)  
D) \( p / a^2 - c^2 \).

77. A person is hurt on kicking a stone due to

A) reaction  
B) mass  
C) velocity  
D) momentum.

நேர்வலையில் ஒருவருக்கு தட்டுக்கொள்ளும் ஆலோசனை எப்படி ஏற்படுகிறது?

A) நேர்வலையில்  
B) தட்டுக்கொள்ளும்  
C) இரண்டமுள்ளது  
D) தட்டுக்கொள்ளும்.
78. Which of the following harbours is not a natural harbour?

A) Cochin  
B) Chennai  
C) Mumbai  
D) Paradwip.

79. Recently one Indian cricket player has become the Sixth Batsman to score 10,000 runs in Test Cricket. The name of the player is

A) Sachin Tendulkar  
B) Virender Sehwag  
C) Sourav Ganguly  
D) Rahul Dravid.

80. The battle of Wandiwash was fought between

A) Marathas and Portuguese  
B) the English and the French  
C) the English and Portuguese  
D) Marathas and the English.

81. Linear programming is designed by

A) B. F. Skinner  
B) E. L. Thorndike  
C) L. P. Pavlov  
D) Clark L. Hull.

---

A
82. Which of the following first identified the Secondary Education as a weak link and suggested improvement?

A) The Tarachand Committee (1948)
C) The University Education Commission (1949)

83. Intelligence test scores are reasonably stable after the age of

A) one  B) two  C) five  D) twenty.

84. Which one is not an S-R theory with reinforcement?

A) E. L. Thorndike’s theory
B) Hull’s theory
C) B. F. Skinner’s theory
D) Tolman’s theory of learning.

85. The emphasis of National Board for Adult Education on Curriculum is that it must be

A) need-based  B) functional
C) job-oriented  D) production-oriented.
86. World First Aid Day is
A) September 11  
B) September 12  
C) September 10  
D) September 9.

87. For the following scores
10, 11, 13, 10, 15, 17, 18, 15, 10
the value of mode is
A) 10  
B) 13  
C) 15  
D) 18.

88. Educational Technology means
A) Technology in Education  
B) Technology of Education  
C) both of these  
D) none of these.

89. Which one of the following is not a cause for forgetting?
A) When something learned and not used repeatedly  
B) Interference with present learning  
C) Lack of reorganisation of the learning material  
D) Learning on the basis of short-term remembrance.
90. When the reason for acting is in the action, motivation is said to be
A) extrinsic  B) intrinsic
C) extrinsic & intrinsic  D) none of these.

91. National Integration Day is
A) November 19  B) December 19
C) September 19  D) May 19.

92. The importance of Teacher Education was first emphasized by
A) the Woods Dispatch  B) the Hunter Commission
C) Calcutta University Commission  D) the White Paper.

93. Taxonomy of educational objectives was first developed by
A) Mager  B) Skinner
C) Bloom  D) Thorndike.
94. SSA is established for achievement of
   A) Elementary Education           B) Secondary Education
   C) Higher Education               D) Vocational Education.
   SSA காரணம் உறுதியற்றபட்டுள்ளது தொடர்பட்டக்கான கொண்டாகும்; ?
   A) கல்லறை கல்லிடி           B) கல்லறைக் கல்லிடி
   C) சுமார்க்கனி               D) சுமார்க்கனி.

95. Whose philosophy is characterised as “Naturalistic in its setting, Idealistic in its aim and Pragmatic in its method and Programme of work”?
   A) Sri Aurobindo               B) Gandhiji
   C) Rousseau                   D) Tagore.

96. Multi-factor theory of intelligence was developed by
   A) Charles Spearman           B) E. L. Thorndike
   C) L. L. Thurstone            D) Dr. J. P. Guilford.

97. The time of flight on the inclined plane of angle $\alpha$ inclined at an angle $\beta$ is
   A) $\frac{u \sin \alpha}{g}$       B) $\frac{2u \sin (\alpha - \beta)}{g}$
   C) $\frac{u \sin (\alpha - \beta)}{g}$ D) $\frac{2u \sin (\alpha - \beta)}{g \cos \beta}$.

A
98. The range on the inclined plane of angle $\alpha$ inclined at an angle $\beta$ is

A) $\frac{2u^2 \sin (\alpha - \beta)}{g \cos^2 \beta}$  
B) $\frac{2u^2 \sin (\alpha - \beta)}{g \cos \beta}$  
C) $\frac{u^2 \sin (\alpha - \beta)}{g \cos \beta}$  
D) $\frac{2u^2 \cos \alpha \sin (\alpha - \beta)}{g \cos^2 \beta}$  

99. Time taken by the projectile to reach the greatest height is

A) $\frac{u \cos \alpha}{g}$  
B) $\frac{u^2 \sin 2\alpha}{g}$  
C) $\frac{u \sin \alpha}{g^2}$  
D) $\frac{u \sin \alpha}{g}$  

100. The time of flight of a projectile is

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

101. If forces $\vec{P}$ and $\vec{Q}$ are at right angles to each other, then the magnitude of their resultant $\vec{R}$ is

A) $R = \sqrt{P^2 + Q^2}$  
B) $R = \sqrt{P^2 + Q^2 + 2PQ}$  
C) $R = 2P$  
D) $R = P + Q$.  

[ Turn over ]
102. A uniform ladder rests with one of its ends on a rough ground (μ — coefficient of friction) and the other end on a smooth wall. The angle which it makes with the horizontal is

A) \( \tan^{-1} \mu \)  
B) \( \tan^{-1} 2\mu \)  
C) \( \tan^{-1} \left( \frac{1}{2\mu} \right) \)  
D) \( \tan^{-1} 2\mu \)

103. \( \triangle ABC \) is a triangle and \( O \) is the incentre of the triangle. Forces \( \vec{P}, \vec{Q}, \vec{R} \) acting along the lines \( \overline{OA}, \overline{OB}, \overline{OC} \) are in equilibrium. \( P : Q : R = \)

A) \( \cos \frac{A}{2} : \cos \frac{B}{2} : \cos \frac{C}{2} \)  
B) \( a : b : c \)  
C) \( \sin A : \sin B : \sin C \)  
D) \( OA : OB : OC \).
104. When one body in contact with another is in equilibrium, the friction exerted is just sufficient to maintain equilibrium and is called

A) statical friction  B) dynamical friction

C) limiting friction  D) cone of friction.

105. The resultant of two equal forces \( P, P \) at an angle \( \alpha \) is

A) \( 2P \cos \frac{\alpha}{2} \)  B) \( 2 \cos \frac{\alpha}{2} \)

C) \( 2P \)  D) \( 2P \sin \frac{\alpha}{2} \).

106. The resultant of two forces \( P \) and \( Q \) is \( R \). If \( Q \) is doubled, \( R \) is doubled. \( R \) is also doubled when \( Q \) is reversed. Then \( P : Q : R = \)

A) \( \sqrt{3} : \sqrt{2} : \sqrt{2} \)  B) \( \sqrt{2} : \sqrt{3} : \sqrt{2} \)

C) \( \sqrt{2} : \sqrt{2} : \sqrt{3} \)  D) \( \sqrt{3} : \sqrt{2} : \sqrt{3} \).

P, Q வாய்ப்பு அல்லது விலைகள் விலை வேறு \( P \) அல்ல. \( Q \)டிரவம்க் அளவுடைய \( R \) அல்லது \( Q \)டிரவம்க் அளவுடைய \( R \) டிரவம்க் அளவுடைய. இந்தை \( Q \)சிற்புக்கு (Reverse) குறிப்பிட்டு \( R \)டிரவம்க் அளவுடைய வரிசை \( P : Q : R = \)

A) \( \sqrt{3} : \sqrt{2} : \sqrt{2} \)  B) \( \sqrt{2} : \sqrt{3} : \sqrt{2} \)

C) \( \sqrt{2} : \sqrt{2} : \sqrt{3} \)  D) \( \sqrt{3} : \sqrt{2} : \sqrt{3} \).
107. The Taylor's series for $\frac{1}{z}$ about $z = 1$ is

A) $1 + \frac{z}{1!} + \frac{z^2}{2!} + \ldots$

B) $1 - (z - 1) + (z - 1)^2 - (z - 1)^3 + \ldots$

C) $1 + (z - 1) + (z - 1)^2 + \ldots$

D) $1 + z + z^2 + z^3 + \ldots$

$z = 1$ மற்றும் பட்டங்களின் $\frac{1}{z}$ க்கு பல்வேறு கிளையோ

A) $1 + \frac{z}{1!} + \frac{z^2}{2!} + \ldots$

B) $1 - (z - 1) + (z - 1)^2 - (z - 1)^3 + \ldots$

C) $1 + (z - 1) + (z - 1)^2 + \ldots$

D) $1 + z + z^2 + z^3 + \ldots$

108. The residue of $\frac{z + 1}{z^2 - 2z}$ at $z = 2$ is

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

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

C) $0$

D) $\frac{4}{5}$

$z = 2$ மற்றும், $\frac{z + 1}{z^2 - 2z}$ க்கு பல்வேறு கிளையோ

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

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

C) $0$

D) $\frac{4}{5}$

109. The value of $\lim_{z \to 2} \frac{z^2 - 4}{z - 2}$ is

A) 2

B) 4

C) 1

D) 8

$\lim_{z \to 2} \frac{z^2 - 4}{z - 2}$ க்கு பல்வேறு

A) 2

B) 4

C) 1

D) 8
110. The angle of rotation at \( z = 1 + i \) under the map \( w = z^2 \) is

A) \( \frac{\pi}{4} \)  
B) \( \frac{\pi}{2} \)  
C) 0  
D) \( \pi \).

111. The series \( \sum \frac{n^2 + 1}{5^n} \)

A) oscillates  
B) diverges to \( +\infty \)  
C) diverges to \( -\infty \)  
D) converges.

112. If \( f(z) = a \left( x^2 - y^2 \right) + ibxy + c \) is differential at every point, the constants

A) \( 2b = a \)  
B) \( 4b = a \)  
C) \( 2a = b \)  
D) \( a = b \).

113. If \( a_n = 1 + \frac{1}{1!} + \frac{1}{2!} + \ldots + \frac{1}{n!} \), then \( \left( a_n \right) \) is

A) strictly monotonic decreasing series  
B) monotonic decreasing series  
C) monotonic increasing series  
D) oscillating.
\[ \alpha_n = 1 + \frac{1}{1!} + \frac{1}{2!} + \ldots + \frac{1}{n!} \text{ terms.} \]

A) \text{Divergent}
B) \text{Conditionally convergent}
C) \text{Absolutely convergent}
D) \text{Power series.}

114. The series \( \sum (-1)^n \left[ \frac{n^2 + 1}{n!} \right] \) is

A) Absolutely convergent
B) Conditionally convergent
C) Divergent
D) Power series.

\[ \sum (-1)^n \left[ \frac{n^2 + 1}{n!} \right] \]

A) \text{Alternating}
B) \text{Divergent}
C) \text{Convergent}
D) \text{Power series.}

115. In \( \mathbb{R} \) with usual metric, the incorrect statement is

A) \( Z \) is closed
B) \( Q \) is closed
C) \( R \) is closed
D) \( \{ a \} \) is closed, \( a \in R \).

116. If \( d \) is a metric on \( M \), the incorrect statement is

A) \( \sqrt{d} \) is a metric on \( M \)
B) \( \frac{d}{1 + d} \) is a metric on \( M \)
C) \( d^2 \) is a metric on \( M \)
D) \( nd \) is a metric on \( M, n \in N \).

\( M \) is \( d \) \text{ a metric on } M, \text{ then } M \text{ is a metric space?}
A) \( M \) is \( \sqrt{d} \) \text{ a metric on } M
B) \( M \) is \( \frac{d}{1 + d} \) \text{ a metric on } M
C) \( M \) is \( d^2 \) \text{ a metric on } M
D) \( M \) is \( nd \) \text{ a metric on } M, n \in N.
117. Which one of the following sets of vectors is linearly dependent?

A) \{ (1, 4, -2), (-1, 1, 3), (-4, 11, 5) \}

B) \{ (1, 2, 1), (2, 1, 0), (-1, -1, 2) \}

C) \{ (1, 0, 0), (0, 1, 0), (1, 1, 0) \}

D) \{ (0, 0, 0), (2, 5, 3), (-1, 0, 6) \}.

118. Which one of the following sets of vectors is not a basis for \(V_3(R)\)?

A) \{ (1, 0, 0), (1, 1, 0) \}

B) \{ (1, 0, 0), (0, 1, 0), (0, 0, 1) \}

C) \{ (1, 0, 0), (0, 1, 0), (1, 1, 1) \}

D) \{ (1, 1, 0), (0, 1, 1), (1, 0, 1) \}.

119. The set \( R = \left\{ \begin{pmatrix} a & b \\ -b & a \end{pmatrix} \mid a, b \in R \right\} \) is a ring under matrix addition and multiplication. The inverse of \( \begin{pmatrix} a & b \\ -b & a \end{pmatrix} \) is

A) \( \begin{pmatrix} -a & b \\ -b & a \end{pmatrix} \)

B) \( \begin{pmatrix} a - b \\ -b & a \end{pmatrix} \)

C) \( \begin{pmatrix} a + b \\ -b - a \end{pmatrix} \)

D) \( \begin{pmatrix} -a - b \\ b - a \end{pmatrix} \).

[ Turn over }
120. If a non-empty subset $W$ of a vector space $V$ over a field $F$ is a subspace of $V$, then $\alpha, \beta \in F$ and $u, v \in W \Rightarrow$

A) $\alpha u + \beta v \in W$
B) $\alpha u + \beta v \notin W$
C) $\alpha u + \beta v \in V$
D) $\alpha u \in W$.

$W$ கொண்டு $F$ கோர் காட்சிகள் மூலம் தேவை தேவை $V$ கோரத்தின் ஒருதளமான வலமின் $\alpha, \beta \in F, u, v \in W \Rightarrow$

A) $\alpha u + \beta v \not\in W$
B) $\alpha u + \beta v \in W$
C) $\alpha u + \beta v \not\in V$
D) $\alpha u \in W$.

121. If $A$ and $B$ are two finite subgroups of group $G$, then

A) $[G : A] = [G : B | B : A]$  
B) $[G : B] = [G : A | A : B]$

C) $|AB| = \frac{|A| |B|}{|A \cap B|}$  
D) $|AB| = \frac{|A| |B|}{|A \cup B|}$.

A. $B$ கோர் கோரமும் $G$ கோர் கோராளிகள் மூலம் ஒருநூற்றாண்டான வலமின் $\alpha, \beta \in F, u, v \in W \Rightarrow$

A) $[G : A] = [G : B | B : A]$  
B) $[G : B] = [G : A | A : B]$

C) $|AB| = \frac{|A| |B|}{|A \cap B|}$  
D) $|AB| = \frac{|A| |B|}{|A \cup B|}$.

A
122. Which of the following tables can represent a group?

<table>
<thead>
<tr>
<th>*</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

A) 1 1 0
B) 1 1 1 1
C) 0 2 0
D) 3 9 12

<table>
<thead>
<tr>
<th>*</th>
<th>1</th>
<th>-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1 1</td>
</tr>
<tr>
<td>-1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

123. The radius of the sphere \( 2x^2 + 2y^2 + 2z^2 - 2x + 2y - 4z - 5 = 0 \) is

A) 1
B) 5
C) 2
D) 4.

\[ 2x^2 + 2y^2 + 2z^2 - 2x + 2y - 4z - 5 = 0 \] is

A) 1
B) 5
C) 2
D) 4.

124. If \( S = 0 \) and \( S_1 = 0 \) represent two spheres, then \( S - S_1 = 0 \) is

A) sphere
B) plane
C) line
D) circle.

\[ S = 0 \text{ and } S_1 = 0 \] is

A) இடைநிலை / middle
B) முன்னை / top
C) குறு / left
D) மட்டும் / only.

A)
125. The value of $\int_{0}^{1} \int_{0}^{2} xy^2 \, dy \, dx =$

A) $\frac{8}{3}$    B) $\frac{4}{3}$

C) $\frac{2}{3}$    D) $\frac{1}{3}$

$\int_{0}^{1} \int_{0}^{2} xy^2 \, dy \, dx = \frac{8}{3}.$

A) $\frac{8}{3}$    B) $\frac{4}{3}$

C) $\frac{2}{3}$    D) $\frac{1}{3}$

126. The line $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$ is parallel to the plane $ax + by + cz + d = 0$ if

A) $xx_1 + yy_1 + zz_1 = 0$    B) $l^2 + m^2 + n^2 = 0$

C) $\frac{a}{l} = \frac{b}{m} = \frac{c}{n}$    D) $al + bm + cn = 0.$

$\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$  என்பது $ax + by + cz + d = 0$ கோபுரத்தை கூறுகிறது

A) $xx_1 + yy_1 + zz_1 = 0$    B) $l^2 + m^2 + n^2 = 0$

C) $\frac{a}{l} = \frac{b}{m} = \frac{c}{n}$    D) $al + bm + cn = 0.$

127. For any constant vector $\vec{a}, \nabla (\vec{a} \cdot \vec{r}) =$

A) $\vec{r}$    B) $\vec{a}$

C) $a$    D) $r.$

$\vec{a}$ மற்றும் $\vec{r}$ தரும் கோனின் வருப்பு $\nabla (\vec{a} \cdot \vec{r}) =$

A) $\vec{r}$    B) $\vec{a}$

C) $a$    D) $r.$
128. If \( \mathbf{\vec{f}} = (ax + 3y + 4z) \mathbf{\hat{i}} + (x - 3y + 3z) \mathbf{\hat{j}} + (3x + 2y - z) \mathbf{\hat{k}} \) is solenoidal, the value of \( a \) is

A) 2  
B) 4  
C) 3  
D) 0.

129. \( L \left( x^2 e^{-ax} \right) = \)

A) \( \frac{2}{(s + a)^3} \)  
B) \( \frac{2}{(s + a)^2} \)  
C) \( \frac{1}{(s + a)^3} \)  
D) \( \frac{1}{(s + a)^2} \).

130. The particular integral of \( \left( D^2 - 2D + 2 \right) y = e^x \sin x \) is

A) \( \frac{e^x \cos x}{2} \)  
B) \( -\frac{xe^x \cos x}{2} \)  
C) \( \frac{xe^x \cos x}{2} \)  
D) \( -\frac{x \cos x}{2} \).

131. Clairaut's form of differential equation is

A) \( y = f(x, p) \)  
B) \( y = px + f(p) \)  
C) \( x = f(y, p) \)  
D) \( Mdx + Ndy = 0 \).

[ Turn over ]
132. The particular solution of \( (D^2 + 9) y = \cos 3x \) is

A) \( y = \frac{\cos x}{2} \) \\
B) \( y = \frac{\sin 3x}{6} \) \\
C) \( y = \frac{x \sin 3x}{6} \) \\
D) \( y = \frac{x^2 \sin 3x}{6} \).

133. If \( I = \int \sec^3 x \, dx \), then \( 2I = \)

A) \( \sec x \tan x \) \\
C) \( \frac{\sec^4 x}{4} \) \\
B) \( \sec^4 x \) \\
D) \( \sec x \tan x + \log (\sec x + \tan x) \).

\( I = \int \sec^3 x \, dx \) என்று, \( 2I = \)

A) \( \sec x \tan x \) \\
C) \( \frac{\sec^4 x}{4} \) \\
B) \( \sec^4 x \) \\
D) \( \sec x \tan x + \log (\sec x + \tan x) \).

134. If \( M \, dx + N \, dy = 0 \) is of the form

\( y f(xy) \, dx + x g(xy) \, dy = 0, f(xy) \neq g(xy) \), then integrating factor is

A) \( \frac{1}{Mx - Ny} \) \\
C) \( e^{\int p \, dx} \) \\
B) \( \frac{1}{Mx + Ny} \) \\
D) \( \frac{1}{f(xy) + g(xy)} \).

\( M \, dx + N \, dy = 0 \) என்று, \( y f(xy) \, dx + x g(xy) \, dy = 0, f(xy) \neq g(xy) \) என்பதற்கு இருந்தாலும், தொடர்புடைய கருத்தை

A) \( \frac{1}{Mx - Ny} \) \\
C) \( e^{\int p \, dx} \) \\
B) \( \frac{1}{Mx + Ny} \) \\
D) \( \frac{1}{f(xy) + g(xy)} \).
135. The centre of curvature at \( \left( \frac{1}{2}, \frac{1}{4} \right) \) on \( y = x^2 \) is

A) \((3, 2)\)  \quad B) \((0, 1)\)

C) \((2, 4)\)  \quad D) \(\left( -\frac{1}{2}, \frac{5}{4} \right)\).

\(\left( \frac{1}{2}, \frac{1}{4} \right)\) ന് \( y = x^2 \) ദീക്ഷ മാക്കുന്നതിനുവേ മാത്രം തിരിച്ചെത്താം

A) \((3, 2)\)  \quad B) \((0, 1)\)

C) \((2, 4)\)  \quad D) \(\left( -\frac{1}{2}, \frac{5}{4} \right)\).

136. The value of \( \int_{0}^{\pi/2} \cos^5 x \, dx = \)

A) \(\frac{5\pi}{32}\)  \quad B) \(\frac{8}{15}\)

C) \(2\pi\)  \quad D) \(\frac{\pi}{2}\).

\(\int_{0}^{\pi/2} \cos^5 x \, dx\) എന്ന മാത്രമെന്ന് എന്നാണ്

A) \(\frac{5\pi}{32}\)  \quad B) \(\frac{8}{15}\)

C) \(2\pi\)  \quad D) \(\frac{\pi}{2}\).

137. The value of \( C \) of Lagrange's mean value theorem for \( f(x) = \left( x^2 - 4 \right)^{1/2} \) in 

\([2, 3]\) is

A) 2  \quad B) 3

C) \(\pm \sqrt{5}\)  \quad D) \(\pm \sqrt{8}\).

A)
2. \( f(x) = \left(x^2 - 4\right)^{1/2} \) \( \frac{d^n \log(ax + b)}{dx^n} = \)

A) \((-1)^{n-1} a^{n(n-1)!} (ax + b)^{-n}\)

B) \((-1)^{n-1} (n-1)! (ax + b)^{-n}\)

C) \((-1)^{n-1} a^n (ax + b)^{-n}\)

D) \((-1)^{n-1} a^n (n-1)! (ax + b)^n\).

3. \( \cos(\sin x) = \)

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

B) \(1 + \frac{x}{2}\)

C) \(1 + \frac{x^2}{4}\)

D) \(1 - \frac{x^2}{2}\).

A)
140. If $\frac{\sin \theta}{\theta} = \frac{863}{864}$, nearly $\theta =$

A) $\frac{1}{8}$

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

C) $\frac{1}{12}$

D) $\frac{1}{6}$

$\frac{\sin \theta}{\theta} = \frac{863}{864}$ எனில், $\theta$ =

A) $\frac{1}{8}$

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

C) $\frac{1}{12}$

D) $\frac{1}{6}$

141. If $z = \cos \theta + i \sin \theta$, $\frac{z^2 - 1}{z^2 + 1} =$

A) $i \sin \theta$

B) $i \cos \theta$

C) $i \tan \theta$

D) $i \cot \theta$

$z = \cos \theta + i \sin \theta$ எனில் $\frac{z^2 - 1}{z^2 + 1} =$

A) $i \sin \theta$

B) $i \cos \theta$

C) $i \tan \theta$

D) $i \cot \theta$

142. $\sin^2 \theta \cos^3 \theta =$

A) $-\frac{1}{16} [ \cos 5\theta + \cos 3\theta - 2 \cos \theta ]$

B) $\frac{1}{8} [ \cos 5\theta + \cos 3\theta - 2 \cos \theta ]$

C) $\frac{1}{16} [ \sin 5\theta + \sin 3\theta - 2 \sin \theta ]$

D) $\frac{1}{4} [ \sin 5\theta + \sin 3\theta - 2 \sin \theta ]$.

A | Turn over
\[ \sin^2 \theta \cos^3 \theta = \]

A) \[ -\frac{1}{16} \left[ \cos 5\theta + \cos 3\theta - 2 \cos \theta \right] \]

B) \[ \frac{1}{8} \left[ \cos 5\theta + \cos 3\theta - 2 \cos \theta \right] \]

C) \[ \frac{1}{16} \left[ \sin 5\theta + \sin 3\theta - 2 \sin \theta \right] \]

D) \[ \frac{1}{4} \left[ \sin 5\theta + \sin 3\theta - 2 \sin \theta \right] \].

143. The eccentric angles of the ends of a pair of conjugate diameters of an ellipse differ by

A) 90°  
B) 45°  
C) 80°  
D) 60°.

144. With usual notations the points of intersection of the conjugate diameter and the conjugate hyperbola are

A) \[ (\pm ai \tan \theta, \pm bi \sec \theta) \]  
B) \[ (\pm i \tan \theta, \pm i \sec \theta) \]  
C) \[ (\pm a \tan \theta, \pm b \sec \theta) \]  
D) \[ (\pm i \cos \theta, \pm i \sin \theta) \].

145. A skew Hermitian matrix is

A) \[
\begin{pmatrix}
ib & c + id \\
-c + id & ib
\end{pmatrix}
\]

B) \[
\begin{pmatrix}
0 & -a + ib \\
a + ib & ib
\end{pmatrix}
\]

C) \[
\begin{pmatrix}
ia & -c + id \\
c + id & 0
\end{pmatrix}
\]

D) \[
\begin{pmatrix}
0 & a + ib \\
ia & 0
\end{pmatrix}
\]
146. The rank of \[
\begin{pmatrix}
1 & 1 & 1 \\
1 & 2 & 3 \\
1 & 4 & 7
\end{pmatrix}
\] is

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

147. The smallest degree of an equation with rational coefficients, one of whose roots is \(\sqrt{2} + \sqrt{3}\) is

A) 4  
B) 2  
C) 1  
D) 5.
148. The Highest Common Factor (H.C.F.) of \(2x^3 + 5x^2 + x - 2\) and \(2x^2 - 3x + 1\) is

A) \(x - 1\)  
B) \(2x - 1\)

C) \(x + 1\)  
D) \(2x + 1\).

\(2x^3 + 5x^2 + x - 2\) என்று \(2x^2 - 3x + 1\) கான்முனையை விளக்கும் விளக்கம் காரணி

A) \(x - 1\)  
B) \(2x - 1\)

C) \(x + 1\)  
D) \(2x + 1\).

149. The smallest divisor, greater than 1 of any integer greater than 1 is

A) odd number  
B) composite number

C) prime number  
D) even number.

150. If \(X > 0\), \(\frac{X - 1}{X + 1} + \frac{1}{2} \frac{X^2 - 1}{(X + 1)^2} + \frac{1}{3} \frac{X^3 - 1}{(X + 1)^3} \ldots \ldots = \)

A) \(\log X^2\)  
B) \(\log X\)

C) \(\log \sqrt{X}\)  
D) \(\log 2X\).

\(X > 0\) என்று \(\frac{X - 1}{X + 1} + \frac{1}{2} \frac{X^2 - 1}{(X + 1)^2} + \frac{1}{3} \frac{X^3 - 1}{(X + 1)^3} \ldots \ldots = \)

A) \(\log X^2\)  
B) \(\log X\)

C) \(\log \sqrt{X}\)  
D) \(\log 2X\).
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