Target's

20 Question Paper Set

MHT– CET

Physics, Chemistry, Mathematics & Biology

Salient Features

- Set of 20 question papers with solutions each for Physics, Chemistry, Mathematics and Biology.
- Prepared as per the latest paper pattern of MHT-CET.
- Exhaustive coverage of MCQs from all chapters.
- Hints provided wherever necessary.
- Simple and Lucid language.
- Self-evaluative in nature.

Printed at: **Repro Knowledgecast Ltd.,** Mumbai

P.O. No. 104871

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Note: Questions of standard XI are indicated by '*' in each test.

MODEL TEST – 01 (Paper - I)

1. The conditional $(p \wedge q) \rightarrow p$ is
   (A) a tautology
   (B) a contradiction
   (C) neither tautology nor contradiction
   (D) None of these.

2. The angle between the lines whose direction cosines are $\frac{\sqrt{3}}{4}, \frac{1}{4}, \frac{\sqrt{3}}{2}$ and $\frac{\sqrt{3}}{4}, \frac{1}{4}, \frac{-\sqrt{3}}{2}$ is
   (A) π (B) $\frac{\pi}{2}$
   (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

3. A man make attempts to hit the target. The probability of hitting the target is $\frac{3}{5}$. Then the probability that he hit the target exactly 2 times in 5 attempts, is
   (A) $\frac{144}{625}$ (B) $\frac{72}{3125}$
   (C) $\frac{216}{625}$ (D) $\frac{144}{3125}$

4. Integrating factor of the equation $(x^2+1)\frac{dy}{dx} + 2xy = x^2 - 1$ is
   (A) $x^2 + 1$ (B) $\frac{2x}{x^2+1}$
   (C) $\frac{x^2-1}{x^2+1}$ (D) $\frac{2x}{x^2-1}$

5. Find the separate equations of lines for a pair of lines whose equation is $x^2 + xy - 12y^2 = 0$
   (A) $x - 4y = 0$ and $x + 3y = 0$
   (B) $4x + y = 0$ and $3x - y = 0$
   (C) $4x - y = 0$ and $3x + y = 0$
   (D) $x + 4y = 0$ and $x - 3y = 0$

6. In a ΔABC, $a^2 \sin 2C + c^2 \sin 2A =$
   (A) Δ (B) 2Δ
   (C) 3Δ (D) 4Δ
   (where Δ is the area of triangle ABC)

*7. In a class of 130 students, 44 play football, 41 play basketball and 50 students donot play any of these games. How many play football and basketball?
   (A) 5 (B) 6
   (C) 7 (D) 8

*8. The sum of first n even natural numbers is
   (A) n^2 (B) $n(n+1)$
   (C) $n(n+2)$ (D) $\frac{n(n+2)}{2}$

9. If a line in the space makes angles α, β and γ with the co-ordinate axes, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma + \sin^2\alpha + \sin^2\beta + \sin^2\gamma =$
   (A) -1 (B) 0
   (C) 1 (D) 2

10. If $f(x) = \frac{x^2 - 10x + 25}{x^2 - 7x + 10}$, $x \neq 5$ and f is continuous at $x = 5$, then $f(5) =$
   (A) 0 (B) 5
   (C) 10 (D) 25

11. Approximate value of $\tan^{-1}(0.999)$ is
   (A) 0.7849 (B) 0.847
   (C) 0.787 (D) 0.748

12. If $A = \begin{bmatrix} 1 & 2 \\ 3 & -5 \end{bmatrix}$, then $A^{-1} =$
   (A) $\begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix}$ (B) $\begin{bmatrix} \frac{5}{11} & \frac{2}{11} \\ \frac{3}{11} & \frac{-1}{11} \end{bmatrix}$
   (C) $\begin{bmatrix} \frac{-5}{11} & \frac{-2}{11} \\ \frac{-3}{11} & \frac{1}{11} \end{bmatrix}$ (D) $\begin{bmatrix} 5 & 2 \\ 3 & -1 \end{bmatrix}$

13. If $\sin^{-1} x = \frac{\pi}{5}$, for some $x \in [-1, 1]$, then the value of $\cos^{-1} x$ is
   (A) $\frac{3\pi}{10}$ (B) $\frac{5\pi}{10}$
   (C) $\frac{7\pi}{10}$ (D) $\frac{9\pi}{10}$

*14. From a book containing 100 pages, one page is selected at random. The probability that the sum of the digits of the page number of the selected page is 12 is

(A) $\frac{7}{100}$ (B) $\frac{9}{100}$

(C) $\frac{11}{100}$ (D) $\frac{1}{20}$

15. $\int_0^1 \tan^{-1} x \, dx =$

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

(C) $\frac{\pi}{4} - \log 2$ (D) $\pi - \log 2$

16. The area of the region bounded by $y = 2x + 1$, $y = 3x + 1$ and $x = 4$ is

(A) 2 sq. units (B) 4 sq. units

(C) 6 sq. units (D) 8 sq. units

17. If $y = 1 - x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \ldots$, then $\frac{d^2 y}{dx^2} =$

(A) x (B) y

(C) $-x$ (D) $-y$

18. $\int \frac{1+x^2}{\sqrt{1-x^2}} dx =$

(A) $\frac{3}{2}\sin^{-1} x - \frac{1}{2}x\sqrt{1-x^2} + c$

(B) $\frac{3}{2}\sin^{-1} x + \frac{1}{2}x\sqrt{1-x^2} + c$

(C) $\frac{3}{2}\cos^{-1} x - \frac{1}{2}x\sqrt{1-x^2} + c$

(D) $\frac{3}{2}\cos^{-1} x + \frac{1}{2}x\sqrt{1-x^2} + c$

*19. The sum of the series 3 + 33 + 333 + …. + n terms is

(A) $\frac{1}{27}(10^{n+1} + 9n - 28)$

(B) $\frac{1}{27}(10^{n+1} - 9n - 10)$

(C) $\frac{1}{27}(10^{n+1} + 10n - 9)$

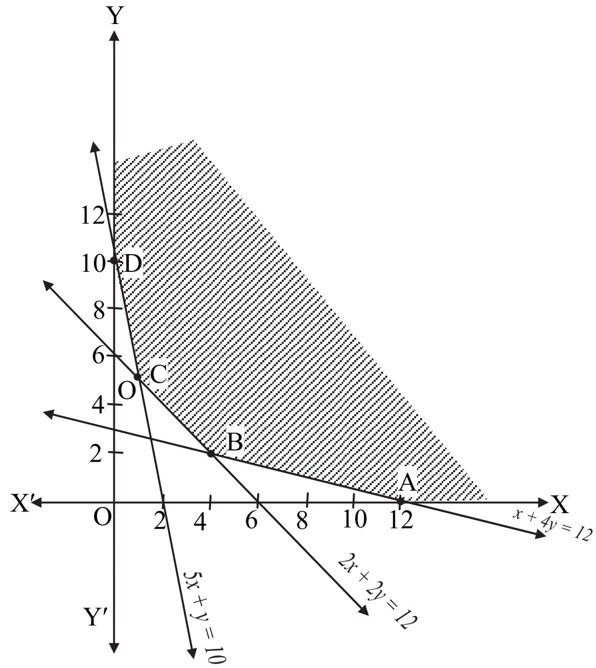
(D) 27

20. If for the matrix A, $A^3 = I$, then $A^{-1} =$

(A) A^2 (B) A^3

(C) A (D) does not exist

21. From the graph given below minimum value of z = 4x + 5y ocuurs at (x , y) =



(A) (0,10) (B) (1,5)

(C) (4,2) (D) (12,0)

22. If $f(x) = \begin{cases} 2x+1, & x < 2 \\ k, & x = 2 \\ 3x-1, & x > 2 \end{cases}$, is continuous at $x = 2$, then the value of k is

(A) 2 (B) 3

(C) 4 (D) 5

23. If $x = a\cos^4\theta$ and $y = a\sin^4\theta$, then $\frac{dy}{dx}$ at $\theta = \frac{3\pi}{4}$ is

(A) a^2 (B) 1

(C) $-a^2$ (D) -1

*24. The equation of circle whose diameter lies on $3x + 5y = -7$ and $2x - y = 4$ which passes through $\left(-5, \frac{1}{2}\right)$ is

(A) $x^2 + y^2 - 2x + 4y = 149$

(B) $x^2 + y^2 - 2x + 4y = \frac{149}{4}$

(C) $x^2 + y^2 + 2x - 4y = 149$

(D) $x^2 + y^2 + 2x - 4y = \frac{149}{4}$

*25. Equation of line passing through the point (3, 2) and perpendicular to the line $y = 5x - 2$ is

(A) $5x - y - 13 = 0$

(B) $5x + y - 13 = 0$

(C) $x - 5y - 13 = 0$

(D) $x + 5y - 13 = 0$

26. The function $f(x) = \tan x - x$

(A) Always increases

(B) Always decreases

(C) Never decreases

(D) Sometimes increases and sometimes decreases

27. If $y = \sqrt{x+\sqrt{x+\sqrt{x+....\text{to}\infty}}}$, then $\frac{dy}{dx} =$

(A) $\frac{x}{2y-1}$ (B) $\frac{1}{2y-1}$

(C) $\frac{2}{2y-1}$ (D) $-\frac{1}{2y-1}$

28. $\int [\sin(\log x) + \cos(\log x)]\, dx =$

(A) $x \cos(\log x) + c$

(B) $\sin(\log x) + c$

(C) $\cos(\log x) + c$

(D) $x \sin(\log x) + c$

*29. $\cos\frac{\pi}{5}\cos\frac{2\pi}{5}\cos\frac{4\pi}{5}\cos\frac{8\pi}{5} =$

(A) $\frac{1}{16}$ (B) 0

(C) $\frac{-1}{8}$ (D) $\frac{-1}{16}$

30. $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{\tan x}} =$

(A) $\frac{\pi}{12}$ (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{4}$

31. The general solution of $\tan 5\theta = \cot 2\theta$ is

(A) $\theta = \frac{n\pi}{7} + \frac{\pi}{3}, n \in Z$

(B) $\theta = \frac{n\pi}{7} + \frac{\pi}{5}, n \in Z$

(C) $\theta = \frac{n\pi}{7} + \frac{\pi}{2}, n \in Z$

(D) $\theta = \frac{n\pi}{7} + \frac{\pi}{14}, n \in Z$

32. The angle between the lines represented by the equation $ax^2 + xy + by^2 = 0$ will be 45°, if

(A) a = 1, b = 6

(B) a = 6, b = –1

(C) a = 6, b = 1

(D) a = 1, b = 1

*33. sin 600° + cos 600° is

(A) negative

(B) positive

(C) zero

(D) zero or positive

34. If the line $\bar{r} = \hat{i} + \lambda(2\hat{i} - m\hat{j} - 3\hat{k})$ is parallel to the plane $\bar{r}.(m\hat{i} + 3\hat{j} + \hat{k}) = 0$, then m is equal to

(A) 3 (B) – 3

(C) 1 (D) – 1

35. $\int_0^{\frac{\pi}{2}} \sqrt{\cos\theta}\sin^3\theta\, d\theta =$

(A) $\frac{20}{21}$ (B) $\frac{8}{21}$

(C) $\frac{-20}{21}$ (D) $\frac{-8}{21}$.

36. The point of intersection of the lines $2x^2 - 5xy + 3y^2 + 8x - 9y + 6 = 0$ is

(A) (–3, 4)

(B) (3, –5)

(C) (3, 4)

(D) (–3, –5)

37. The value of $\int_{-2}^{2} (ax^3 + bx + c)\, dx$ depends on the

(A) value of a

(B) value of b

(C) value of c

(D) values of a and b

38. The particular solution of $3e^x \tan y dx + (1 + e^x)\sec^2 y dy = 0$, when $x = 0$, $y = \pi$ is

(A) $(1 + e^x)\tan y = 0$

(B) $(1 + e^x)^2\tan y = 0$

(C) $(1 + e^x)^3\tan y = 0$

(D) $(1 + e^x)\tan^2 y = 0$

39. A random variable x has the following probability distribution

X	0	1	2	3	4	5	6	7
P(X)	0	p	2p	2p	3p	p^2	$2p^2$	$7p^2 + p$

Then the value of p is

(A) -1 (B) $-\frac{1}{10}$

(C) $\frac{1}{10}$ (D) 1

40. If in ΔABC, $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$, then the triangle is

(A) equilateral

(B) isosceles

(C) right angled

(D) obtuse angled

*41. The foci of $64x^2 + 100y^2 = 6400$ are

(A) $(\pm 3, 0)$

(B) $(\pm 6, 0)$

(C) $(0, \pm 3)$

(D) $(0, \pm 6)$

42. The value of k for which the function

$f(x) = \begin{cases} ke^{-3x}, & x > 0 \\ 0, & \text{otherwise} \end{cases}$ is a p.d.f. is

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

(C) 2 (D) 1

43. The equation of a line passing through the point $(-3, 2, -4)$ and equally inclined to the axes, are

(A) $x - 3 = y + 2 = z - 4$

(B) $x + 3 = y - 2 = z + 4$

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

(D) $\frac{x-1}{-3} = \frac{y-1}{2} = \frac{z-1}{-4}$

44. $\bar{a}.[(\bar{b}+\bar{c})\times(\bar{a}+\bar{b}+\bar{c})]$ is equal to

(A) $[\bar{a}\ \bar{b}\ \bar{c}]$

(B) $2[\bar{a}\ \bar{b}\ \bar{c}]$

(C) $3[\bar{a}\ \bar{b}\ \bar{c}]$

(D) 0

45. The direction cosines of a normal to the plane $\bar{r}.(2\hat{i} - 3\hat{j} - 6\hat{k}) = -14$ are

(A) $(2, -3, -6)$

(B) $\left(\frac{2}{7}, \frac{-3}{7}, \frac{-6}{7}\right)$

(C) $(-2, 3, 6)$

(D) $\left(\frac{-2}{7}, \frac{3}{7}, \frac{6}{7}\right)$

46. Which of the following statement is correct?

(A) Every L.P.P. has no optimal solution

(B) A L.P.P. has a unique solution

(C) A L.P.P. has two optimal solution

(D) If a L.P.P. has two optimal solution then it has an infinite number of optimal solution

47. The order of the differential equation whose solution is $x^2 + y^2 + 2gx + 2fy + c = 0$, is

(A) 1 (B) 2

(C) 3 (D) 4

*48. The value of $\sin\frac{\pi}{16}\sin\frac{3\pi}{16}\sin\frac{5\pi}{16}\sin\frac{7\pi}{16}$ is

(A) $\frac{1}{16}$ (B) $\frac{\sqrt{2}}{16}$

(C) $\frac{1}{8}$ (D) $\frac{\sqrt{2}}{8}$

49. The radius of a soap bubble increases at the rate of 0.2 cm/sec. The rate at which its volume is increasing, when its radius is 5 cm, is

(A) 15π cc/sec

(B) 18π cc/sec

(C) 20π cc/sec

(D) 22π cc/sec

50. If $2\bar{a} + \bar{b} = 3\bar{c}$, then A divides BC in the ratio

(A) 3 : 1 externally

(B) 3 :1 internally

(C) 1 : 3 externally

(D) 1 : 3 internally