

Mock test for March 2007 Exams

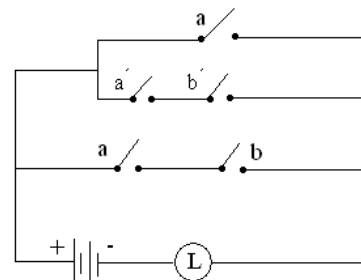
Section A

1. If $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ 0 & 2 \\ 5 & 0 \end{bmatrix}$, verify $(AB)^T = B^T A^T$ 3
2. Using properties of determinants, prove that $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix} = (x-y)(y-z)(z-x)$ 3
3. The odds in favour of an event are 3:5. Find the probability of an occurrence of an event. 3
4. A bag contains 5 white, 7 red and 8 black balls. If 4 balls are drawn at random one by one with replacement, what is the probability that (i) None is white (ii) All are white (iii) Only 2 are white. 3
5. Evaluate $\int \sqrt{1+2 \tan x (\sec x + \tan x)} dx$ 3
6. Evaluate $\int \frac{1}{\sqrt{(2-x)^2 - 1}} dx$ 3
7. Obtain the differential equation of the family of all circles in a plane. 3
8. Solve the differential equation $(x^2 - y^2) dx + 2xy dy = 0$, given that $y = 1$ when $x = 1$. 3
9. Prove that $a + b = 0 \Rightarrow a = 0 = b$

OR

Find the Boolean Function representing the given Circuit. Also find the equivalent simpler circuit.

4



10. Evaluate $\lim_{x \rightarrow 1} \frac{1 - \frac{1}{x}}{\sin \pi(x-1)}$ 4
11. Differentiate $\tan(3x-2)$ with respect to x , ab initio. 4

12. If $x = a(\cos \theta + \theta \sin \theta)$; $y = a(\sin \theta - \theta \cos \theta)$, find $\frac{d^2y}{dx^2}$ 4

13. From a cylindrical drum containing oil and kept vertical, the oil is leaking at the rate of $10\text{cm}^3/\text{sec}$. If the radius of the drum is 10 cm and height 50 cm. find the rate at which level of oil is changing when oil level is 20 cm. 4

14. Evaluate $\int \frac{x^2 + 1}{x^4 + 1} dx$ 4

15. Evaluate $\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx$

OR

Evaluate $\int_0^1 x(1-x)^n dx$ 4

16. Solve the equations by finding A^{-1} , $x + 2y - 3z = 6$, $3x + y - 2z = 3$, $2x - y + z = 2$. 6

17. Show that the height of the right circular cylinder of maximum volume that can be inscribed in a given right circular cone of height h is $\frac{h}{3}$.

OR

Show that the cone of greatest volume which can be inscribed in a given sphere is such that three times, its altitude is twice the diameter of the sphere. Find the volume of the largest cone inscribed in a sphere of radius R .

6

18. Find the area of the smaller part of the circle $x^2 + y^2 = a^2$ cut off by the line $x = \frac{a}{\sqrt{2}}$

OR

Evaluate $\int_a^b \cos x dx$ as a limit of sum. 6

Section B

19. The position vectors of the points A, B, C and D are $3\hat{i} - 2\hat{j} - \hat{k}$, $2\hat{i} + 3\hat{j} - 4\hat{k}$, $-\hat{i} + \hat{j} + 2\hat{k}$, $4\hat{i} + 5\hat{j} + \lambda\hat{k}$ respectively. If the points A, B, C and D are coplanar, find the value of λ . 3

20. If \vec{a} , \vec{b} , \vec{c} are perpendicular to each other, then prove that $(\vec{a} \cdot \vec{b} \times \vec{c})^2 = a^2 b^2 c^2$ 3

21. A particle moves with uniform acceleration and passes over 600m in the 10th second and 720 m in the 12th second. Find the initial velocity of the particle. 3
22. A ball is thrown from the top of Qutab Minar 200 m high with a velocity of 80 m/sec. at an angle of 30° with the horizontal. Find the horizontal distance from the foot of Qutab Minar to the point where it hits the ground.

OR

A man rows across a floating river in time t_1 and rows an equal distance down the stream in time t_2 . If x be the velocity of man in still water and y that of the stream, show that

$$t_1 : t_2 = \sqrt{x+y} : \sqrt{x-y} . \quad 6$$

23. Find the distance of the point $(1, -2, 3)$ from the plane $x - y + z = 5$, measured parallel to $\frac{x+1}{2} = \frac{y+3}{3} = \frac{z+1}{-6}$ 4
24. Two unlike parallel forces P and Q ($P > Q$) act at A and B , respectively. If P and Q are both increased by x , show that the resultant will move through a distance $\frac{x \cdot AB}{P - Q}$. 4
25. Forces $P, 2P, -P$ and $2P$ act along the sides AB, BC, CD and DA respectively of the square $ABCD$ and a force $p\sqrt{2}$ acts along each of the diagonals BD and CA . show that the forces reduce to a couple of moment $2ap$, where a is the side of the square. 4
26. Prove that the plane $x + 2y - z = 4$, cuts the sphere $x^2 + y^2 + z^2 - x + z - 2 = 0$ in a circle of radius unity. Also, find the centre of this circle. 6

Visit **cbsemath.com** *the no. 1 CBSE website in the world*

Free services available

- (a) Latest CBSE sample papers class V11 to X11
- (b) Latest CBSE syllabus for all subjects
- (c) Latest CBSE Paper patterns
- (d) First time in India - Free ask a math 1X or X CBSE question Free
- (e) One more first in India - CBSE project help in Mathematics class 1X and X..
- (f) CBSE results 2007 visit cbsemath.com

and regularly updated much more