[Model Test–15(Q)/Cl–XI(Anl'14)(cbse)/ 11th Feb'14] MODEL TEST (Pre ANNUAL'14) [FM–100 /Time–180 min.]

General Instructions :

i) All questions are compulsory.
ii) Q. 1 to Q. 6 of Section A are of 1 mark each.
iii) Q. 7 to Q. 19 of Section B are of 4 marks each.
iv) Q. 20 to Q. 26 of Section C are of 6 marks each.
v) There is no overall choice. However an internal choice has been provided in some questions.

Section-A (01 mark each) [1×6=6]

1. If A = {1, 2, 3, 4}, B = {2, 4, 5, 8} and C = {3, 4, 5, 6, 7}, then find $A \cup (B \cap C)$.
2. Write the amplitude [illegible] of $(-\sqrt{3} - i)$
3. Form the disjunction of the following simple statements:
   p: The sun shines. *q* : It rains.
4. If $f(x) = x^{100} + x^{99} + x^{98} + \cdots + x + 1$, then, find $f'(1)$
5. Three digit numbers are formed using the digits 0, 2, 4, 6, 8. A number is chosen at random out of these numbers. What is the probability that this number has the same digits ? [iv]
6. What is y-intercept of the line passing through the point (2, 2) and perpendicular to the line 3x + y = 3 ?

Section-B (04 marks each) [4×13=52]

7. Evaluate: $\lim_{x \to 0} \dfrac{\cos(2014\theta) - \cos(2013x)}{x^2}$
8. Find $\dfrac{dy}{dx}$: $y = \dfrac{\tan x + \sec x - 1}{\tan x - \sec x + 1}$.
9. α, β are the roots of the equation $x^2 + 2px - 2q^2 = 0$ and 'p', 'q' are real but $(p^2 + q^2)$ is not a perfect square. Find the quadratic equation, which has $\alpha + \beta + \sqrt{\alpha^2 + \beta^2}$ as one of its roots.
10. In a cricket team of 14 players 6 are bowlers. How many different teams of 11 players can be formed taking at least 4 bowlers in the team?
11. Write the term free from p for the expression $\left(\dfrac{p+1}{p^{\frac{2}{3}} + 1 - p^{\frac{1}{3}}} - \dfrac{p-1}{p - \sqrt{p}} \right)^{10}$
12. Let R be a relation in set A = {1, 2, 3, 4, 5, 6, 7} defined as R = {(a, b): a divides b, a ≠ b}. Write R in Roster form and hence write its domain and range.
13. Prove that, $\tan 7\frac{1}{2}^\circ = \sqrt{6} - \sqrt{3} + \sqrt{2} - 2$
14. Find the coordinates of the point, at which yz plane divides the line segment joining points (4, 8, 10) and (6, 10, –8).
15. Find the image of the point (3, 8) with respect to the line x + 3y = 7 assuming the line to be a plane mirror.
16. Find the equations of the circles passing through the point (–4, 3) and touching the lines x+y= 2 and x – y = 2. [IIT'82] [Ans: $x^2 + y^2 + 2(10 \pm 3\sqrt{6})x + (55 \pm 24\sqrt{6}) = 0$]

17. The coordinates of the vertex of a parabola is (– 2, 3). If the equation of its directrix is 2x + 3y + 8 = 0, then find the equation of the parabola.
18. The lengths of the latus rectum of an ellipse is 8 units and that of the major axis, which lies along the x–axis, is 18 units. Find its equation in the standard form. Determine the coordinates of the foci and the equations of its directrices.
19. Considering the rectangular Cartesian coordinate axes as the axes of the hyperbola, determine the equation of the hyperbola which has the points (5, 0) and (–5, 0) as focii and 5 /4 as eccentricity.

Section-C (06 marks each) [6×7=42]

20. Prove by using mathematical induction rule $\frac{1}{2.5}+\frac{1}{5.8}+\frac{1}{8.11}+\cdots+\frac{1}{(3n-1)(3n+2)}=\frac{n}{6n+4}$ $(n \in N)$
21. Find the sum of the series to n terms : 1 + 5 + 12 + 22 + 35+ …
22. Find the general solution : tanx + tan2x + tan3x = 0.
23. Given below are two statements, p: 25 is a multiple of 5. q: 25 is a multiple of 8. Write the compound statements connecting these two statements with "And" and "Or". In both cases check the validity of the compound statement.
24. Show that the solution set of the following system of linear inequalities is an unbounded region : $x + y \le 5$, $2x-3y \ge 6$, $x-2 \ge 0$
25. A number is taken at random from the first 50 natural numbers. Find the probability that the number taken is divisible by 4 or 5.
26. Calculate the mean , variance and standard deviation for the following frequency distribution:

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

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Address:
SAMIR KUMAR BASU
BASU-NIKETAN,
BONMASJID, KALNA ROAD
P.O+Dist-BURDWAN Pin-713101
Mob- 9434100810