MODEL TEST PAPER 2010-2011
SUBJECT: MATHEMATICS
CLASS: XI th

TIME ALLOWED:3 HRS **M.M.: 100**

GENERAL INSTRUCTIONS:

- All questions are compulsory.
- Section A consists of ten questions of 1 mark each.
- Section B consists of twelve questions of 4 marks each.
- Section C consists of seven questions of 6 marks each.
- Use of calculators is not permitted. However you may ask for logarithimic tables if required.
- No step marking for 1 mark questions of Section A.

SECTION A

Question 1: If D,G and R denote respectively the number of degrees, grades and radians in an angle, then find the value of D/100 in grades and in radians.

Question 2: Find the value of $\sin(-11\pi/3)$.

Question 3: Find the value of $(1+i)(1+i^2)(1+i^3)(1+i^4)$.

Question 4: If ${}^{22}P_{r+1} : {}^{20}P_{r+2} = 11:52$, find the value of r.

Question 5: Find the sum of the following series.

$$(a^2-b^2),(a-b),(a-b/a+b),\ldots\ldots\text{to n terms.}$$

Question 6: Write down the equation of a line parallel to y-axis at a distance of 5 units on the left hand side of it.

Question 7: Evaluate: $\lim\limits_{x\to a} \dfrac{x\sqrt{x}-a\sqrt{a}}{x-a}$

Question 8: If $y=1+\frac{x}{1!}+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots\ldots..$, show that $\frac{dy}{dx}=y$.

Question 9: Sample A has a mean bursting pressure of 21 kg and S.D. 4.87. Sample B has mean bursting pressure of 21.81 kg and S.D. 7.07.Which sample has the highest average bursting pressure? Which has more uniform pressure?

Question10: Three dice are thrown together. Find the probability of getting a total of at least 6.

SECTION B

Question 11: If $\tan\frac{\theta}{2}=\sqrt{\frac{1-e}{1+e}}\tan\Phi$, then find the value of $\cos\Phi$ in terms of θ and e.

Question 12: Find all non-zero complex number z satisfying $\bar{z}=iz^2$.

Question 13: Solve: $\frac{|x+3|+x}{x+2}>1$.

Question 14: How many five-letter words can be formed using the letter of the word 'INEFFECTIVE'?

Question 15: If a_1, a_2, a_3, a_4 be the coefficients of four consecutive terms in the expansion of $(1+x)^n$, then prove that : $\frac{a_1}{a_1+a_2}+\frac{a_3}{a_3+a_4}=\frac{2a_2}{a_2+a_3}$

Question 16: In an increasing G.P., the sum of the first and the last term is 66, the product of the second and the last but one is 128 and the sum of the terms is 126. How many terms are there in the progression?

Question 17: One side of a square makes an angle θ with x-axis and one vertex of the square is at the origin. Prove that the equations of its diagonals are $x(\sin\theta+\cos\theta)=y(\cos\theta-\sin\theta)$ and $x(\cos\theta-\sin\theta)+y(\sin\theta+\cos\theta)=a$, where a is the length of the side of the square.

Question 18: Find the equation of a circle which passes through the point (2,0) and whose centre is the limit of the point of intersection of the lines $3x+5y=1$ and $(2+c)x+5c^2y=1$ as $c \to 1$.

Question 19: If b,c,d be the ordinates of a vertices of the triangle inscribed in a parabola $y^2=4ax$, then show that the area of the triangle is $\frac{1}{8a}|(b-c)(c-d)(d-b)|$.

Question 20: Evaluate the following limit:

$$\lim_{y \to 0} \frac{(x+y)\sec(x+y) - x\sec x}{y}$$

Question 21: Find the derivative of $\sqrt[3]{\sin x}$ by first principle.

Question 22: Five persons entered the lift cabin on the ground floor of an 8-floor house. Suppose that each of them independently and with equal probability can leave the cabin at any floor beginning with the first. Find out the probability of all five persons leaving at different doors .

SECTION C

Question 23: In a survey of 25 students, it was found that 15 had taken mathematics, 12 had taken Physics and 11 had taken Chemistry, 5 had taken Mathematics and Chemistry, 9 had taken Mathematics and Physics, 4 had taken Physics and Chemistry and 3 had taken all the three subjects. Using the properties of sets find the number of students that had:

(i) only Chemistry.
(ii) only Mathematics.
(iii) only Physics.
(iv) Physics and Chemistry but not Mathematics.
(v) Mathematics and Physics but not Chemistry.
(vi) only one of the subjects.

Question 24: (i) The sum of n, 2n, 3n terms of an A.P. are S_1, S_2, S_3 respectively. Prove that: $S_3 = 3(S_2 - S_1)$

(ii) The mid-points of the sides of a triangle are (1,5,-1) , (0,4,-2) and (2,3,4). Find its vertices.

Question 25: If $\underline{\sin(\theta+\Phi)} = \underline{1-m}$, then find the value of $\tan(\pi/4-\theta)\tan(\pi/4-\Phi)$.

$\cos(\theta - \Phi) \quad 1+m$

Question 26: Find the sum of first n terms of the following series:

(i) 5+11+19+29+41+……. (ii) 5+7+13+31+85+……

Question 27: Suppose that samples of tyres from two manufactures, A and B, are tested by a prospective buyer for bursting pressure, with the following results:

Bursting Pressure in kg	***Number of bags manufactured by manufacturer***	
	A	***B***
5-10	2	9
10-15	9	11
15-20	29	18
20-25	54	32
25-30	11	27
30-35	5	13

Which set of tyres has the highest average bursting pressure? Which has more uniform pressure?

Question 28: Find the equation of the ellipse whose axes are parallel to the coordinare axis having its centre at the point (2,3) one focus at (3,-3) and one vertex at (4,-3).

Question 29: (i) Prove that: $2.7^n + 3.5^n – 5$ is divisible by 24 using P.M.I. for all n € N.

(ii) Find the domain and range of the function given by: $f(x) = 1- |x-3|$.

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