

BARNES SCHOOL AND JUNIOR COLLEGE, DEVLALI
HALF YEARLY EXAMINATION (2011-12)

MATHEMATICS

Time: 2 ½HRS

CLASS X

Max Marks: 80 marks

Instructions to be followed:

- Answers to this paper must be written on the paper provided separately. You will NOT be allowed to write during the first 15 minutes. This time will be spent in reading the question paper.
- Answer all questions from Section A and ANY FOUR questions from Section B.
- All working including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks.
- Mathematical tables are provided.

SECTION A

(Answer ALL questions from this section)

- Q.1. (a) Find the solution set of $2 \leq 3(x - 2) + 5 < 8$, $x \in W$. Also represent the solution on the number line. [3]
- (b) A dice is thrown. Find the probability of getting (i) an odd number (ii) a perfect square (iii) a number greater than three. [3]
- (c) A certain sum amounts to Rs. 5,292 in two years and Rs. 5,556.60 in three years, interest being compounded annually. Find: (i) the rate of interest (ii) the original sum. [4]
- Q.2. (a) Mrs. Matthew opened a Recurring Deposit Account in a certain bank and deposited Rs. 640 per Month for $4\frac{1}{2}$ years. Find the maturity value of this account, if the bank pays interest @ 12% p.a. [3]
- (b) What number should be added to $2x^3 - 3x^2 - 8x$ so that the resulting polynomial leaves the remainder 10 when divided by $2x + 1$? [3]
- (c) From the following frequency distribution, find : (i) median (ii) lower quartile (iii) upper quartile (iv) inter quartile range [4]

Variate	15	18	20	22	25	27	30
Frequency	4	6	8	9	7	8	6

- Q.3. (a) Given $A = \begin{pmatrix} p & 0 \\ 0 & 2 \end{pmatrix}$, $B = \begin{pmatrix} 0 & -q \\ 1 & 0 \end{pmatrix}$, $C = \begin{pmatrix} 2 & -2 \\ 2 & 2 \end{pmatrix}$ and $BA = C^2$. Find the values of 'p' and 'q' [3]
- (b) The point A (4,6) is first reflected in the origin to point A'. Point A' is then reflected in the Y-axis to point A". (i) Write the co-ordinates of points A' and A" (ii) Write down the single transformation that maps A onto A". [3]
- (c) The catalogue price of a computer set is Rs. 45,000. The shopkeeper gives a discount of 7% on the list price. He gives a further off-season discount of 4% on the balance. However sales tax @ 8% is charged on the remaining amount. Find: (i) the amount of sales tax a customer has to pay (ii) the final price he has to pay for the computer set. [4]
- Q.4. (a) The midpoint of the line segment joining (2a,4) and (-2,2b) is (1, 2a + 1). Find the values of 'a' and 'b'. [3]

- (b) The polynomials $ax^3 - 7x^2 + 7x - 2$ and $x^3 - 2ax^2 + 8x - 8$ when divided by $x - 2$ leave the same remainder. Find the value of 'a'. [3]
- (c) Draw a histogram for the following data: [4]

Weight in Kgs.	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69
No. of students	2	8	12	10	6	4

SECTION B

(Attempt ANY FOUR of the following questions)

- Q.5. (a) Solve for 'x': $x^2 + (3 - 2a)x - 6a = 0$ [3]
- (b) $\frac{x}{3} + \frac{x+1}{4} + \frac{x+2}{5} \leq 25$. Find the value of 'x'. [3]
- (c) A sum of money lent out at compound interest at a certain rate per annum doubles itself in 5 years. Find in how many years will the money become eight times of itself at the same rate of interest per annum. [4]
- Q.6. (a) The line joining P (-4,5) and Q (3,2) intersects the Y-axis at R. PM and QN are perpendiculars from P and Q on the X-axis. Find: (i) the ratio PR:RQ (ii) the co-ordinates of R (iii) the area of quadrilateral PMNQ. [3]
- (b) Let $M \times \begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 2 \end{bmatrix}$ where 'M' is a matrix. Find (i) order of matrix M (ii) matrix M. [3]
- (c) Show that $(x - 1)$ is a factor of $x^3 - 7x^2 + 14x - 8$. Hence, completely factorize the above expression. [4]
- Q.7. (a) Solve : $\frac{x}{x-3} + \frac{x-3}{x} = \frac{5}{2}$ [3]
- (b) The list price of an article is Rs. 3,000. A shopkeeper sells the article to a consumer at the list price and charges sales tax at the prescribed rate of 8%. If the shopkeeper pays a VAT of Rs. 32 to the state government, at what price inclusive of sales tax did the shopkeeper buy the article from the wholesaler? [3]
- (c) Find the mean of the following distribution by step-deviation method: [4]

Class Intervals	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Frequency	10	6	8	12	5	9

- Q.8. (a) Find the co-ordinates of the vertices of the triangle, the midpoints of whose sides are $(0, \frac{1}{2})$, $(\frac{1}{2}, \frac{1}{2})$ and $(\frac{1}{2}, 0)$. [3]
- (b) A man borrowed a sum of money and agrees to pay off by paying Rs. 3,150 at the end of the first year and Rs. 4,410 at the end of the second year. If the rate of compound interest is 5% p.a., find the sum borrowed. [3]
- (c) Mrs. Kundra has a savings account in Bank of Baroda. Her passbook has the following entries: [4]

Date (Year 2006)	Particulars	Withdrawals		Deposits		Balance	
		Rs.	P.	Rs.	P.	Rs.	P.
January 1	B/F					1,276.38	
January 7	By cheque			2,307.25		3,583.63	
March 9	To self	2,000.00				1,583.63	

March 26	By cash		6,200.00	7,783.63
June 10	To cheque	4,500.00		3,283.63
July 15	By clearing		2,628.70	5,912.33
October 18	To cheque no. 227	524.50		5,387.83
October 27	To self	2,700.00		2,687.83
November 3	By cash		1,500.00	4,187.83
December 6	To cheque no. 228	1,000.00		3,187.83
December 23	By transfer		2,927.50	6,115.33

Calculate the interest due to her for the year 2006 @ 4.5% p.a. If the interest is paid once in a year at the end of December, also find the total amount she will receive on 12th January, 2007 if she closes her account.

Q.9. (a) The table below shows the distribution of the scores obtained by 120 shooters in a shooting competition. Using a graph sheet, draw an o-give for the distribution: [6]

Score obtained	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
No. of shooters	5	9	16	22	26	18	11	6	4	3

Using the o-give estimate: (i) the median (ii) the number of shooters who obtained more than 75% scores.

(b) Sumita has a Recurring Deposit Account in a bank of Rs. 2,000 per month @ 10% p.a. If she gets Rs. 25,300 at the time of maturity, find the total time for which the account was held. [4]

Q.10. (a) Mr. Durani bought a plot of land for Rs. 1,80,000 and a car for Rs. 3,20,000 at the same time. The value of the plot grows uniformly @ 30% p.a., while the value of the car depreciates @ 20% in the first year and by 15% thereafter. If he sells the plot of land as well as the car after three years, what will be his profit or loss? [3]

(b) Solve $2x^2 + \sqrt{7}x - 7 = 0$ using formula. [3]

(c) If the points A (4,-5), B (1,1) and C (-2,p) are collinear with B lying between A and C then Find: (i) value of 'P' (ii) the ratio in which B divides line AC. [4]

Q.11. (a) Find the mean for the following frequency by short cut method: [3]

Class Intervals	84 - 90	90 - 96	96 - 102	102 - 108	108 - 114
Frequency	8	12	15	10	5

(b) Given that $x + 2$ and $x + 3$ are factors of $2x^3 + ax^2 + 7x - b$. Determine the values of 'a' and 'b' [3]

(c) A manufacturing company M sells a computer to a distributor D for Rs. 22,000 including sales tax. The distributor D sells it to a retailer R for Rs. 21,750 excluding tax and the retailer sells it to a consumer for Rs. 23,400 plus tax. If the rate of sales tax (under VAT) is 10% Find: (i) Cost price of the computer for D (ii) amount of tax (under VAT) paid by D (iii) amount of tax (under VAT) paid by R (iv) amount of tax received by state government on sale of the computer. [4]