

THE INDIAN SCHOOL
KINGDOM OF BAHRAIN
ANNUAL EXAMINATION – FEBRUARY 2011

STD: XI
SUBJECT: MATHEMATICS

MAX.MARKS: 100
TIME: 3HOURS

General Instructions

1. All questions are compulsory
2. The question paper consists of 29 questions divided in to three sections A, B and C.
3. Question numbers 1 to 10 are of 1 mark each, Question numbers 11 to 22 are of 4 marks each and Question numbers 23 to 29 are of 6 marks each.
4. All the questions in section A are to be answered in one word, one sentence or as per the exact requirement of the question.
5. This question paper contains 3 printed pages

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1. If $A = \{a, b, c, d\}$ and $B = \{c, d, e, f, g\}$, find $A - B$
 2. Find the domain of $f(x) = \sqrt{16 - x^2}$
 3. Evaluate $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 4x}$
 4. Differentiate $\frac{x-1}{x+1}$ with respect to x
 5. Find the modulus of the complex number $\frac{1}{2-2i}$
 6. Find the middle term in the expansion of $\left(\frac{x}{3} + 9y\right)^{10}$
 7. Find the equation of a line passing through (2,2) and (-1,3)
 8. Three vertices of a parallelogram are (1,2,-3), (3,-1,0) and (3,-2,1). Find the fourth vertex
 9. Write the contra positive of the statement 'If a number is divisible by 9, then it is divisible by 3'
 10. Write the negation of the statement "Everyone in France speaks French"

SECTION B

11. If $A = \{1,2,3,4,5\}$ $B = \{1,3,5,8\}$ and $C = \{2,5,7,8\}$ Verify that $A - (B \cup C) = (A - B) \cap (A - C)$

12. In a survey of 75 people it was found that 30 read newspaper A, 26 read newspaper B and 28 read newspaper C. If 9 read A&B, 11 read newspaper A and C, 8 read B and C and 3 read all the three newspapers. Find

- 1) Number of people who read at least one of the newspapers
- 2) Number of people who read exactly one newspaper
- 3) How many read newspaper C only

13. If $f = \{(1,5), (2,7)\}$ be a function from Z to Z given by $f(x) = ax + b$ find a and b

14. Find the range of the function $f(x) = \frac{x^2}{1+x^2}$; $x \in \mathbb{R}$ by giving proper explanation.

15. Find the general solution of $\cos 3x + \cos x - \cos 2x = 0$

OR

If $\tan A = k \tan B$, show that $\sin(A+B) = \frac{k+1}{k-1} \sin(A-B)$

16. Prove the following by the principle of mathematical induction, for any natural number n

$$\frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \dots + \frac{1}{(2n+1)(2n+3)} = \frac{n}{3(2n+3)}$$

17. Find sum to n terms of the sequence $0.8 + 0.88 + 0.888 + 0.8888 + \dots$

OR

Find sum to n terms of $3 \times 1^2 + 5 \times 2^2 + 7 \times 3^2 + \dots$

18. Find the value of n such that $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the Geometric mean between a and b

OR

The sum of the first p terms of an AP is equal to sum of the first q terms, Find the sum of the first $(p+q)$ terms

19. Find the equation of the lines through the points $(3,2)$ which make an angle of 45° with the line $x-2y=3$

20. Find the equation of a hyperbola having foci at $(0, \sqrt{10})$ and passing through $(2,3)$

21. Find the points on the y axis which are at a distance of $5\sqrt{2}$ from the points $(3,-2,5)$

22. Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \sin x}{(\pi - 2x)^2}$

OR

Find derivative of $\cos x$ by first principle

Section C

23. If $\tan x = -\frac{4}{3}$ and x in second quadrant, find the values of $\sin x/2, \cos x/2$ and $\tan x/2$

OR

If $\tan(\alpha + \theta) = n \tan(\alpha - \theta)$, Show that $(n+1)\sin 2\theta = (n-1)\sin 2\alpha$

24. Find the Mean and variance of the following data

classes	0-30	30-60	60-90	90-120	120-150	150-180	180-210
frequencies	9	17	43	82	81	44	24

25. Two students A and B appeared in an examination and their respective probabilities of qualifying in the examination 0.2 and 0.15. The probability that both will qualify the examination is 0.05. find the probability that

- i) Both A and B will not qualify the examination
- ii) At least one of them will not qualify for the exam
- iii) Exactly one of them will qualify the examination

26. $2x + y \leq 24$; $x + y \leq 11$, $2x + y \leq 40$, $x \geq 0$, $y \geq 0$, solve graphically

27. Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5.7.....(2n-1)2^n x^n}{n!}$

OR

The second, third and fourth terms in the binomial expansion of $(x + a)^n$ are 240, 720, and 1080, respectively. Find x, a and n

28. Convert $\frac{i-1}{\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}}$ into polar form

29. Find the number of permutations of the letters of the word INDEPENDENCE. In how many of these arrangements

- i) Do the words start with C
- ii) Do all the vowels occur together
- iii) Do the vowels never occur together
- iv) Do the words begin with I and end in P

OR

A group consists of 4 girls and 6 boys. In how many ways can a team of 4 members be selected if the team has

- a) At most 2 girls b) at least one boy and one girl c) at least 2 girls

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