

LIBR 5

INTERNATIONAL INDIAN SCHOOL DAMMAM  
MODEL EXAMINATION 2015  
GRADE – 11

SUBJECT: MATHEMATICS

TIME: 3 HOURS

MAX MARK: 100

SET – A

General Instructions

1. All questions are compulsory.
2. The question paper consists of 26 questions divided into sections A, B, and C. Section A comprises of 6 questions of one mark each, Section B comprises of 13 questions of four marks each and Section C comprises of 7 questions of six marks each.
3. All questions in Section A are to be answered in one word, one sentence or as per exact requirement of the question.
4. There is no overall choice. However, internal choice has been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculator is not permitted. You may ask for logarithmic tables, if required

SECTION A

1. Let A and B be two sets such that  $n(A) = 20, n(A \cup B) = 42, n(A \cap B) = 4$   
Find  $n(B - A)$
2. Determine whether an inclusive "OR" or exclusive "OR" is used in the following statement. Give reasons for your answer. "Two lines intersect at a point or are parallel."
3. Identify the quantifier in the following statement and write the negation of the statement "There exists a number which is equal to its square."
4. Evaluate  $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$ .
5. By giving a counter example, show that the following statement is not true.  
p: the equation  $x^2 - 1 = 0$  does not have a root lying between 0 and 2.
6. If  $\lim_{x \rightarrow a} \frac{x^5 - a^5}{x - a} = 405$ . Find all possible values of a.

**SECTION B**

7. Let  $f = \{(1,1), (2,3), (0,-1), (-1,-3)\}$  be a linear function from  $Z$  to  $Z$ .  
Find  $f(x)$ .

(OR)

Draw the graph of the function  $f$  defined by

$$f(x) = \begin{cases} 1-x & , x < 0 \\ 1 & , x = 0 \\ x+1 & , x > 0 \end{cases}$$

8. Prove that  $\tan 7A - \tan 5A - \tan 2A = \tan 7A \tan 5A \tan 2A$ .

9. Find the general solution of the equation

$$2 \cos^2 x + 3\sqrt{3} \sin x - 5 = 0$$

(OR)

If  $\tan \theta = \frac{a}{b}$  Prove that  $b \cos 2\theta + a \sin 2\theta = b$

10. Prove the following by using the principle of mathematical induction for all  $n \in \mathbb{N}$ ,

$$\frac{1}{3 \cdot 5} + \frac{1}{5 \cdot 7} + \frac{1}{7 \cdot 9} + \dots + \frac{1}{(2n+1) \cdot (2n+3)} = \frac{n}{3(2n+3)}$$

(OR)

Prove the following by using the principle of mathematical induction for all  $n \in \mathbb{N}$ ,

$$3^{2n+2} - 8n - 9 \text{ is divisible by } 8.$$

11. Find 'n' if the ratio of the fifth term from the beginning to the fifth term from the end in

the expansion of  $\left(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}}\right)^n$  is  $\sqrt{6} : 1$

12. Find  $\sqrt{3-4i}$ .

13. Find the coordinates of the foci, the vertices, the lengths of major and minor axes, eccentricity and length of latus rectum of the ellipse  $9x^2 + 4y^2 = 36$

(OR)

Find the equation of the circle which passes through the points  $(3,-2)$  and  $(-2,0)$  and has its centre on the line  $2x - y = 3$

14. Find the derivative of  $\frac{x^2 \sin x}{1+x^2}$ .
15. Find the points of trisection of the line segment joining the points P(4, -5, 3) and Q(1, 2, 4)
16. A school decided to award its students who were 100% regular in the attendance. Find the number of permutations of all the letters of the word "attendance" such that all the vowels are never together. Do you think being regular in school helps in overall development of the student? Justify your answer.
17. How many different selections of 4 books can be made from 10 different books if
- there is no restriction
  - two particular books are always selected
  - two particular books are never selected
18. Find four numbers in G.P in which the third term is greater than the first by 9 and the second term is greater than the fourth by 18.
19. Find the domain and range of the functions i)  $f(x) = \frac{x^2 - 9}{x - 3}$  ii)  $f(x) = \sqrt{16 - x^2}$

### SECTION C

20. At break in a school, 123 students go to canteen which sells cakes, ice-cream and buns. 42 students buy ice-cream, 36 buy buns, 10 buy only cakes. 15 students buy ice-cream and buns, 10 buy ice-cream and cakes, and 4 buy cakes and buns but not ice cream and 11 buy ice-cream and buns but not cakes. Draw Venn diagram to illustrate the above information and find
- how many students buy nothing at all
  - how many students buy at least two items
  - how many students buy all three items.
21. Prove that in any  $\Delta ABC$ ,  $2\left(b\cos^2\frac{C}{2} + c\cos^2\frac{B}{2}\right) = a + b + c$

(OR)

Prove that  $\cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x - \frac{\pi}{3}\right) = \frac{3}{2}$

22. Solve graphically:  $x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$ .

23. Find the sum of the following series upto n terms.

$$\frac{1^3}{1} + \frac{1^3 + 2^3}{1+3} + \frac{1^3 + 2^3 + 3^3}{1+3+5} + \dots$$

(OR)

Find the sum to n terms of the series  $3 + 7 + 13 + 21 + 31 + \dots$

24. Find the mean and standard deviation for the following frequency distribution

Classes	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	30	23	20	14	10	3

25. i) Find the angle between the lines  $y - \sqrt{3}x - 5 = 0$  and  $\sqrt{3}y - x + 6 = 0$

ii) A line passing through the points  $(a, 2a)$  and  $(-2, 3)$  is perpendicular to the line

$$4x + 3y + 5 = 0. \text{ Find the value of 'a'}$$

26. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains 1) all kings ii) 3 kings iii) at least 3 kings.

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