INDIAN SCHOOL SALALAH

THIRD TERMINAL EXAMINATION, 2017-18

MATHEMATICS MARKS: 100

CLASS: XI TIME: 3HRS

General Instructions:

i. All questions are compulsory.

ii. This question paper contains 29 questions.

iii. Question 1- 4 in Section A are very short-answer type questions carrying 1 mark each. Question 5-12 in Section B are short-answer type questions carrying 2 marks each. Question 13-23 in Section C are long-answer-I type questions carrying 4 marks each. Question 24-29 in Section D are long-answer-II type questions carrying 6 marks each.

iv. There is no overall choice. However, an internal choice has been provided in three questions of 4 marks each and three questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.

v. Use of calculators is not permitted.

Section. A

Questions 1 to 4 carry 1 mark each.

1. Describe given set $\left\{\frac{1}{2},\frac{2}{3},\frac{3}{4},\frac{4}{5},\frac{5}{6},\frac{6}{7}\right\}$ in the set builder form.
2. Write the contrapositive of the statement: ‘’If a natural number is odd then its square is also odd’’
3. Find $\left(i^{41}+\frac{1}{i^{257}}\right)^{9}$
4. Express $104^{\circ}36'$ in radians.

Section.B

Questions 5 to 12 carry 2 marks each.

5. Define greatest integer function. Also draw its graph with an example.
6. If the arcs of the same lengths in two circles subtend angles 65° and 110° at the centre, find the ratio of their radii.
7. Find the conjugate of $\frac{3-i}{(1-3i)^{2}}$ and express in $a+ib$

8. A coin is tossed. If the outcome is a head, a die is thrown. If the die shows up an even number, the die is thrown again. What is the sample space for the experiment?

9. Find the sum of all natural numbers lying between 100 and 1000, which are multiples of 5.

10. Find the centre and radius of the circle $x^2 + y^2 - 2x + 4y - 4 = 0$.

11. Find $\lim_{x \to \frac{\pi}{2}} \left(\frac{\tan 2x}{x - \frac{\pi}{2}} \right)$

12. A bag contains 8 red balls and 5 white balls. Three balls are drawn at random. Find the probability that i) all the three balls are white. ii) one balls is red and two balls are white .

Section.C

Questions 13 to 23 carry 4 marks each.

13. Let R be a relation on Z defined by $(x, y) \in R$ if and only if $x^2 + y^2 = 64$.

Find i) R ii) Domain of R iii) Range of R

14. Compute derivative of *tanx* by using first principle of derivative.

15. By using principle of mathematical induction prove that

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots\dots\dots\dots\dots + \frac{1}{n(n+1)} = \frac{n}{n+1} \text{ for all } n \in N$$

OR

By using principle of mathematical induction prove that

$$\frac{1^2}{1.3} + \frac{2^2}{3.5} + \frac{3^2}{5.7} + \dots\dots\dots\dots + \frac{n^2}{(2n-1)(2n+1)} = \frac{n(n+1)}{2(2n+1)} \text{ for all } n \in N$$

16. Convert $\frac{1+7i}{(2-i)^2}$ in to the polar form.

17. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these

(i) four cards are of the same suit,

(ii) are face cards

(iii) cards are of the same colour?

18. The sum of first three terms of a G.P. is $\frac{13}{12}$ and their product is – 1. Find the common ratio and the terms.

19. Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5.......(2n-1)}{n!}.2^n x^n$ where n is a positive integer.

OR

Find the term independent of x in the expansion of $\left(\sqrt[3]{x}+\frac{1}{2\sqrt[3]{x}}\right)^{18}$

20. Find the coordinates of the foci, the vertices, legth of latus rectum and eccentricity of the ellipse $9x^2+4y^2=36$.

21. If p is the length of perpendicular from the origin to the line whose intercepts on the axes are a and b, then show that $\frac{1}{p^2}=\frac{1}{a^2}+\frac{1}{b^2}$

OR

a) Find the equation of a line perpendicular to the line $x-2y+3=0$ and passing through the point (1, – 2).

b) Reduce the equation $x-\sqrt{3}+8=0$ into normal form.

22. Find the ratio in which the line segment joining the points (4, 8, 10) and (6, 10, – 8) is divided by the YZ-plane.

23. A and B are two events such that P (A) = 0.54, P (B) = 0.69 and $P(A\cap B)$ = 0.35.

Find (i) $P(A\cup B)$ (ii) $P(A^1\cap B^1)$ (iii) $P(A\cap B^1)$ (iv) $P(A^1\cap B)$

<u>Section.D</u>

Questions 24 to 29 carry 6 marks each.

1. A T.V survey gives the following data for T.V watching: 60% watch program A; 50% watch program B; 47% watch program C; 28% watch program A and B; 23% watch program A and C; 18% watch program B and C; 8% watch program A,B and C. Then find the followings:

a) What percentage watch programs A and B but not C?

b) What percentage watches exactly two programs?

c) What percentage does not watch any program?

d) Do you think that some extent parents should monitor T.V viewing habits of children? If yes, then why?

24. a) Solve: $\sin x + \sin 3x + \sin 5x = 0$

b) Prove that $\frac{a-b}{c} = \frac{\sin\left(\frac{A-B}{2}\right)}{\cos\frac{C}{2}}$

OR

a) Prove that $\frac{\sin(B-C)}{\sin(B+C)} = \frac{b^2-c^2}{a^2}$

b) Prove that $\cos 2x \cos\frac{x}{2} - \cos 3x \cos\frac{9x}{2} = \sin 5x \sin\frac{5x}{2}$

26. Solve the following system of inequalities graphically:

$3x + 2y \le 150;\ x + 4y \le 80;\ x \le 18;\ y \ge 0$

27. The sum of two numbers is 6 times their geometric mean, show that numbers are in the ratio $\left(3+2\sqrt{2}\right):\left(3-2\sqrt{2}\right)$

OR

If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are roots of $x^2 - 12x + q = 0$,where a, b, c, d form a G.P. Prove that $(q + p)$: $(q - p) = 17:15$.

28. Find perpendicular distance from the origin of the line joining the points $(\cos\theta, \sin\theta)$ and $(\cos\phi, \sin\phi)$

OR

a) Find the distance of the line $4x + 7y + 5 = 0$ from the point (1, 2) along the line $2x - y = 0$.

b) P (a, b) is the midpoint of a line segment between the axes. Show that equation of the line is $\frac{x}{a} + \frac{y}{b} = 2$

29. Find the mean and variance for the following frequency distribution.

Class	0-30	30-60	60-90	90-120	120-150	150-180	180-210
Frequency	2	3	5	10	3	5	2

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