Annual Examination, 2020-2021

Mathematics

Grade: 11 **Time allowed: 3 hours**

Date:18.02.2021 **Maximum Marks: 80**

General Instructions:

1. This question paper contains two parts A and B. Each part is compulsory. Part A carries 24 marks and Part B carries 56 marks
2. Part-A has Objective Type Questions and Part -B has Descriptive Type Questions
3. Both Part A and Part B have choices.

Part – A:

1. It consists of two sections- I and II.
2. Section I comprises of 16 very short answer type questions.
3. Section II contains 2 case studies. Each case study comprises of 5 case-based MCQs. An examinee is to attempt any 4 out of 5 MCQs.

Part – B:

1. It consists of three sections- III, IV and V.
2. Section III comprises of 10 questions of 2 marks each.
3. Section IV comprises of 7 questions of 3 marks each.
4. Section V comprises of 3 questions of 5 marks each.
5. Internal choice is provided in 3 questions of Section –III, 2 questions of Section-IV and 3 questions of Section-V. You have to attempt only one of the alternatives in all such questions.

PART - A

Section I

All questions are compulsory. In case of internal choices attempt any one.

1. Find the degree measure corresponding to $\frac{5\pi}{6}$. 1

OR

Find the radian measure of 520°

2. Find the value of $\tan(\frac{22\pi}{3})$. 1

3. Express $3i(\frac{3i}{2})$ in the form of $a + ib$ 1

OR

Evaluate: $(3 + 2i) - (-5 + i)$

4. Evaluate : $\lim_{x \to -1} \frac{x^{20}+x^5+1}{x-1}$ 1

5. If the third term of G.P. is 4,then find the product of its first 5 terms . 1

OR

Find the common ratio of $\sqrt{5}, \sqrt{15}, 3\sqrt{5}, - - - - - - - - -$

6. .Find the derivative of $\sqrt{\sin(3x - 6)}$ w.r.t x 1

7. Find the equation of the circle which passes through the point (4, 5) and has its centre at (3, 2) . 1

OR

If the parabola y^2 = 4ax passes through the point (3, 2), then find the length of its latus rectum.

8. Find the point on x-axis which is equidistant from the point A (3, 2, 2) and B (5, 5, 4). 1

9. Find the eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half of the distance between the foci. 1

OR

Find the length of the latus rectum of the ellipse $3x^2 + y^2 = 12$.

10. In how many ways a committee consisting of 3 men and 2 women, can be chosen from 7 men and 5 women? 1

11. If 9 times the 9th term of an A.P. is equal to 13 times the 13th term, then find its 22nd term. 1

12. Evaluate : $(1 + i)^6 + (1 - i)^3$. 1

13. Solve the inequality: $2 \leq 2x - 4 \leq 8$ 1

14. Find the range of the function f(x) = $x^2 - 1$ 1

15. Let A = {–1, 2, 3} and B = {1, 3}. Determine A × B. 1

16. Write the set {x | x is a positive integer less than 10 and 2^x – 1 is an odd number} in the roster form. 1

Section II

Both the Case study based questions are compulsory. Attempt any 4 sub parts from each question 17$(i-v)$ and 18$(i-v)$. Each question carries 1 mark

17. The table shows information about the times taken by 100 people in a fun run

Time(t minutes)	Frequency
$20 < t \leq 30$	4
$30 < t \leq 40$	16
$40 < t \leq 50$	36
$50 < t \leq 60$	24
$60 < t \leq 70$	14
$70 < t \leq 80$	6

Based on the above information answer the following:

What is the median class of the data?

(i) (a) $30-40$ (b) $40-50$ (c) $50-60$ (d) $60-70$ 1

What is the cumulative frequency of the class $60-70$?

(ii) (a) 14 (b) 94 (c) 80 (d) 56 1

What is the median of the data?

(iii) (a) 48.3 (b) 49.3 (c) 47.3 (d) 50.3 1

What is the mean deviation of the data about median?

(iv) (a) 10.6 (b) 9.8 (c) 10.7 (d) 10.8 1

Which of the following is not a measure of dispersion?

(v) (a) Range (b) Quartile deviation (c) Median (d) Mean deviation 1

18. In a group of 50 students, the number of students studying French, English, Sanskrit were found to be as follows: French = 17, English = 13, Sanskrit = 15, French and English = 09, English and Sanskrit = 4, French and Sanskrit = 5, English, French and Sanskrit = 3.

(i) The number of students who study French only is: 1

a) 6 b) 3 c) 9 d) None of these

(ii) The number of students who study French and Sanskrit but not English is: 1

a) 2 b) 1 c) 9 d) None of these

(iii) The number of students who study English and Sanskrit but not French is: 1

a) 6 b) 1 c) 30 d) None of these

(iv) The number of students who study at least one of the three languages is: 1

a) 20 b) 30 c) 9 d) None of these

(v) The number of students who study none of the languages is 1

a) 20 b) 30 c) 9 d) None of these

Part – B

Section III

19. Evaluate: $\lim_{x\to\frac{\pi}{2}}(\sec x - \tan x)$ 2

OR

Evaluate: $\lim_{x\to 0}\frac{\sin(2+x)-\sin(2-x)}{x}$

20. Given the ellipse with equation 9 x^2+ 25y^2 = 225, find the major and minor axes, eccentricity and foci. 2

OR

Find the centre and radius of the circle $x^2 + y^2$ – 2x + 4y = 8

21. A = {x: x∈ R, x^2+8x+12 = 0},B = {-2,-4,-6}.Check whether A is a subset of B. Give reason. 2

22. Find the domain and range of the relation R given by 2

R={$(x, y): y = x + \frac{6}{x}$; $where\ x, y \in N\ and\ x < 6$}

23. Prove that $\frac{\sin 5x+\sin 3x}{\cos 5x+\cos 3x} = \tan 4x$ 2

OR

Evaluate: $\frac{\tan 169+\tan 146}{1-\tan 169\tan 146}$

24. Solve the quadratic equation $x^2 + x + 1 = 0$ 2

25. Simplify : $\frac{3+5i}{2-i}$ 2

26. A man saved ₹ 66000 in 20 years. In each succeeding year after the first year he saved ₹ 200 more than what he saved in the previous year. How much did he save in the first year? 2

27. In an examination there are three multiple choice questions and each question has 4 choices. Find the number of ways in which a student can fail to get all answer correct . 2

28. How many automobile license plates can be made if each plate contains two different letters followed by three different digits? 2

Section IV

All questions are compulsory. In case of internal choices attempt any one.

29. A bag contains 8 red and 5 white balls. Three balls are drawn at random. Find the probability that 3

(a) All the three balls are white

(b) All the three balls are red (c) One ball is red and two balls are white

30. A card is drawn from a deck of 52 cards. Find the probability of getting a king or a heart or a red card. 3

31. Find the derivative of $x^2\ cosx$. 3

OR

Differentiate $5\ sin\ x + \frac{1}{x} + \sqrt{3-2x}$ w.r.t x

32. If a, b, c are three consecutive terms of an A.P. and x, y, z are three consecutive terms of a G.P. Then prove that $(x^{b-c})(y^{c-a})(z^{a-b}) = 1$ 3

OR

If a, b, c, d are four distinct positive quantities in G.P., then show that

$$a + d > b + c$$

33. In a small village, there are 87 families, of which 52 families have at most 2 children. In a rural development programme 20 families are to be chosen for assistance, of which at least 18 families must have at most 2 children. In how many ways can the choice be made? 3

34. Prove that $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{\tan 8\theta}{\tan 2\theta}$ 3

35. What is the conjugate of $\frac{\sqrt{5+12i}+\sqrt{5-12i}}{\sqrt{5+12i}-\sqrt{5-12i}}$ 3

Section V

All questions are compulsory. In case of internal choices attempt any one.

36. Find the equation of the line passing through the point of intersection of the line $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ that has equal intercepts on the axes . 5

37. Find $\sin\frac{x}{2}$,$\cos\frac{x}{2}$ and $\tan\frac{x}{2}$. Given that $\sin x = \frac{1}{4}$, x in quadrant II 5

OR

Prove that $cos6x = 32cos^6x - 48cos^4x + 18cos^2x - 1$

38. A solution of 9% acid is to be diluted by adding 3% acid solution to it. The resulting mixture is to be more than 5% but less than 7% acid. If there is 460 litres of the 9% solution, how many litres of 3% solution will have to be added? 5

OR

Solve the following system of linear inequalities graphically.

$x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$