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CLASS

11

MATHEMATICS (041)

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3 Unsolved Sample Papers

- ✓ Multiple Choice Questions
- ✓ Assertion-Reason Questions
- ✓ Case Study Questions
- ✓ Subjective Type Questions

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For CBSE Class 11
Annual Exams

MATHEMATICS (041)

By O.P. GUPTA
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YTS-10

☑ **General Instructions :** Same as given in YTS-01.

SECTION A

(Question numbers 01 to 20 carry 1 mark each.)

Followings are **multiple choice questions**. Select the correct option in each one of them.

01. Let A be an infinite set and $A_1, A_2, A_3, \dots, A_n$ be the sets such that $A_1 \cup A_2 \cup A_3 \cup \dots \cup A_n = A$.
Then
(a) at least one of the sets A_i is infinite
(b) not more than one of the sets A_i can be infinite
(c) at least one of the sets A_i is a finite set
(d) not more than one of the sets A_i can be finite
02. Value (s) of θ , $\theta \in (0, 2\pi)$ for which the complex number $\frac{1+i\cos\theta}{1-2i\cos\theta}$ is purely real, is
(a) $\frac{\pi}{4}, \frac{7\pi}{4}$ (b) $\frac{\pi}{2}, \frac{3\pi}{2}$ (c) $\frac{\pi}{2}$ only (d) π only
03. Given that $A = \{x : x \in \mathbb{R}, x > 4\}$ and $B = \{x : x \in \mathbb{R}, x < 7\}$. Then, $A \cap B =$
(a) $[4, 7]$ (b) $[5, 6]$ (c) $(4, 7)$ (d) $\{4, 7\}$
04. Slope of a line perpendicular to the line $2x + y = 5$, is
(a) -2 (b) 2 (c) $-\frac{1}{2}$ (d) $\frac{1}{2}$
05. Radian measure of 75° is
(a) $\frac{7\pi}{12}$ (b) $\frac{\pi}{12}$ (c) $\frac{\pi}{15}$ (d) $\frac{5\pi}{12}$
06. Eccentricity of the parabola $y^2 = -36x$
(a) is 9 (b) is 0 (c) is 1 (d) can not be determined
07. If $f(x) = 4\cos x - 3\sin x$, then the range of the function $f(x)$ is
(a) $[-1, 1]$ (b) $[-5, 5]$ (c) $\left[-\frac{1}{5}, \frac{1}{5}\right]$ (d) $[0, 5]$
08. Value of $\tan 570^\circ$ is
(a) $\frac{1}{\sqrt{3}}$ (b) $\sqrt{3}$ (c) $-\sqrt{3}$ (d) $-\frac{1}{\sqrt{3}}$
09. If $y = \sqrt{\frac{x}{a}} + \sqrt{\frac{a}{x}}$, then $2xy \frac{dy}{dx} =$
(a) $\frac{x}{a} + \frac{a}{x}$ (b) $\frac{x}{a} - \frac{a}{x}$ (c) $\frac{a}{x} - \frac{x}{a}$ (d) 0
10. If $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(X)$, then the set X is equal to
(a) U (Universal set) (b) $A \cup B \cup C$ (c) $A \cap B \cap C$ (d) ϕ (Null set)

11. Consider the data : 3, 3, 4, 5, 7, 9, 10, 12, 18, 19, 21.
Let $d_i = |x_i - M|$ be the respective deviations from the median. Then $\sum d_i =$
(a) 6, 6, 5, 4, 2, 0, 1, 3, 9, 10, 12 (b) 6, 6, 5, 4, 2, 1, 3, 9, 10, 12
(c) 5.27 (d) 58
12. Let $y = 3 - |x + 2|$. Then
(a) $x \in (-\infty, 3]$ (b) $x \in [3, \infty)$ (c) $y \in (-\infty, 3]$ (d) $x \in (3, \infty)$
13. A committee of two persons is selected from 2 men and 2 women. The probability that the committee will have no man, is
(a) $\frac{1}{6}$ (b) $\frac{2}{3}$ (c) $\frac{5}{6}$ (d) $\frac{1}{3}$
14. In the expansion of $(x^2 + 4x + 4)^{20}$, the coefficient of fifth term is
(a) ${}^{40}C_4 (2)^4 x^{36}$ (b) ${}^{40}C_4 (2)^4$ (c) ${}^{40}C_5 (2)^5$ (d) ${}^{40}C_4 (2)^{36} x^4$
15. $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x^7 - 128} =$
(a) 0 (b) 16 (c) $\frac{3}{112}$ (d) $\frac{3}{7}$
16. If x, y and z are in the geometric progression, then which of the following is true?
(a) $2y = x + z$ (b) $y^2 = xz$ (c) $x = \frac{y+z}{2}$ (d) $y = \sqrt{\frac{z}{x}}$
17. Distance of a point P(x, y, z) from origin is given by
(a) $\sqrt{x^2 + y^2}$ (b) $\sqrt{x + y + z}$ (c) $\sqrt{x^2 + y^2 + z^2}$ (d) $x^2 + y^2 + z^2$
18. Mean and variance of 100 observations are 50 and 16, respectively. The sum of the squares of all the observations is
(a) 25000 (b) 2516000 (c) 26000 (d) 251600

Followings are **Assertion-Reason based questions**.

In the following questions, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
 - (b) Both A and R are true and R is not the correct explanation of A.
 - (c) A is true but R is false.
 - (d) A is false but R is true.
19. **Assertion (A)** : For the set $X = \{x : x \in \mathbb{N}, x^2 - 5x - 6 = 0\}$, $n(X) = 2$.
Reason (R) : If $Y = \{p, q, s, t, u, v, w\}$, then $n(Y) = 7$.
 20. **Assertion (A)** : Additive inverse of a complex number $\sqrt{3} - 4i$ is $-\sqrt{3} + 4i$.
Reason (R) : For a complex number $x + iy$, Re Part is x and Im Part is y.

SECTION B

(Question numbers 21 to 25 carry 2 marks each.)

21. Find the angle between hour hand and minute hand of a clock at 7:20.

OR

If $\sec x = \sqrt{2}$; $\frac{3\pi}{2} < x < 2\pi$, then find the value of $\frac{1 + \tan x + \operatorname{cosec} x}{1 + \cot x - \operatorname{cosec} x}$.

22. Solve : $|3 - 6x| \geq 9$.
23. Using properties of sets, show that $A \cap \bar{B} = A - B$.

OR

Let $A_1 = \{2, 3, 4, 5\}$, $A_2 = \{3, 4, 5, 6\}$ and $A_3 = \{4, 5, 6, 7\}$, find $\bigcup_{n=1}^3 A_n$ and $\bigcap_{n=1}^3 A_n$.

24. Write the number of terms in the expansion of $(x + y + z)^n$.

25. Let $A = \{4, 9, 16, 25, 36\}$, $B = \{1, 2, 3, 4\}$.

If R is the relation “is square of” from set A to the set B , write the set corresponding to the relation R . Write roster form of R . Also find the domain, co-domain and the range of R .

SECTION C

(Question numbers 26 to 31 carry 3 marks each.)

26. Prove that : $\frac{1 + \sin \theta - \cos \theta}{1 + \sin \theta + \cos \theta} = \tan \left(\frac{\theta}{2} \right)$.

27. If the first and the n^{th} term of a geometric progression are ‘a’ and ‘b’, respectively, and if P is the product of n terms, then prove that $P^2 = (ab)^n$.

OR

Show that the ratio of the sum of first n terms of a G.P. to the sum of terms from $(n+1)^{\text{th}}$ to $(2n)^{\text{th}}$ term is $\frac{1}{r^n}$.

28. Differentiate the function $f(x) = \frac{2x+3}{3x+2}$ with respect to x , from first principle of derivatives.

OR

Find $\frac{d}{dx} \left(\frac{\sin x - \cos x}{\sin x + \cos x} \right)$.

29. If $a + ib = \frac{c+i}{c-i}$, then prove that $\frac{b}{a} = \frac{2c}{c^2 - 1}$.

30. Evaluate : $\lim_{x \rightarrow 0} \frac{\log(1+3x) - \log(1-x)}{e^{4x} - 1}$.

31. Find the number of words with or without meaning which can be made using all the letters of the word AGAIN. If these words are written as in a dictionary, what will be the 50th word?

OR

A polygon has 35 diagonals. Find the number of its sides.

SECTION D

(Question numbers 32 to 35 carry 5 marks each.)

32. For a group of 200 students, the mean and standard deviations of scores were found to be 40 and 15 respectively. Later on it was discovered that the score of 43 was wrongly taken as 34. Find the correct mean and variance.

OR

The mean of 5 observations is 4.4 and their variance is 8.24. If three of the observations are 1, 2 and 6, find the other two observations.

33. If $\tan \frac{\theta}{2} = \sqrt{\frac{a-b}{a+b}} \tan \frac{\phi}{2}$, then show that $\cos \theta = \frac{a \cos \phi + b}{a + b \cos \phi}$.

34. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus-rectum of $\frac{x^2}{121} + \frac{y^2}{81} = 1$.

OR

Find the equation of a circle passing through the points (5, 7), (6, 6) and (2, -2). Hence, find its centre and the radius.

35. A manufacturer has 600 litres of a 12% solution of acid.
How many litres of a 30% acid solution must be added to it so that the acid content in resulting mixture will be more than 15% but less than 18%?

SECTION E

(Question numbers 36 to 38 carry 4 marks each.)

This section contains **three Case-study / Passage based questions.**

First two questions have **three sub-parts (i), (ii) and (iii) of marks 1, 1 and 2 respectively.**

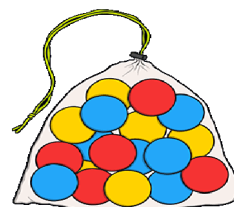
Third question has **two sub-parts (i) and (ii) of 2 marks each.**

36. **CASE STUDY I :** Read the following passage and answer the questions given below.

A bag contains 18 balls of which 5 are red, 7 are blue and 6 are yellow.

The balls are similar in shape and size.

A ball is drawn at random from the bag.

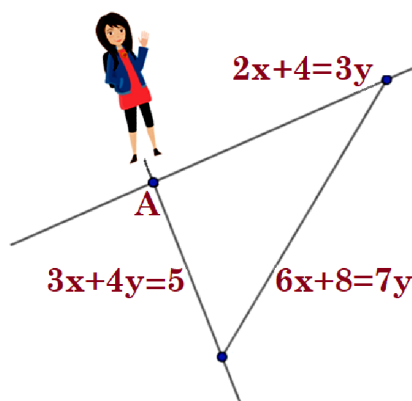


- What is the probability that the ball will be 'red' in color?
- What is the probability that the ball will be 'yellow' in color?
- What is the probability that the ball will be 'blue' in color? What is the probability that the ball will be 'not blue' in color?

OR

- What is the probability that the ball will be 'either red or yellow'?

37. **CASE STUDY II :** Read the following passage and answer the questions given below.



Rajshri is standing at the junction (point A in the diagram shown) of two straight paths represented by the equations $3y = 2x + 4$ and $3x + 4y = 5$.

- Write the slope of the line $3y = 2x + 4$.
- What is the x-intercept made by the line $3x + 4y = 5$?
- Rajshri wants to reach the path whose equation is given by $7y = 6x + 8$ in the least time. Find the equation of the line along which she walks to reach the line $7y = 6x + 8$ in least time.

OR

- Write the coordinates of point A. Hence, write the equation of a line which makes an angle of 135° with the positive direction of x-axis and passes through the point A.

38. **CASE STUDY III :** Read the following passage and answer the questions given below.

A newly established telecom company wishes to launch 10-digits mobile numbers for the customers.

- How many mobile nos. can be generated, starting with 67? Assume that the repetition of digits is not allowed.
- How many mobile nos. can be generated, starting with 78 and ending with 9? Assume that the repetition of digits is allowed.



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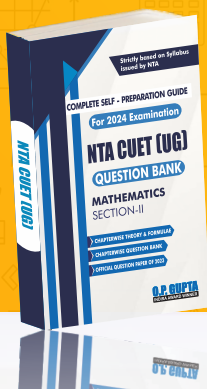


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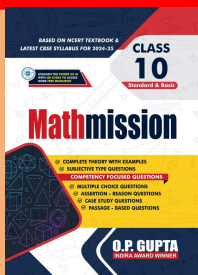
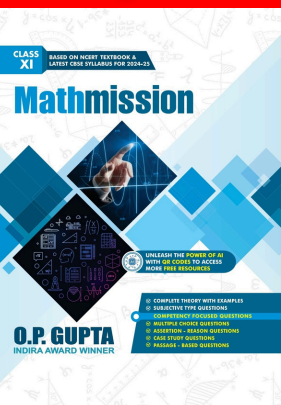
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