Mathademy®

Series : JBB/2

SET – 1

Code No. 30/2/1

Roll No. | | | | | | | | |

Candidates must write the Code on the title page of the answer-book.

	NOTE
(I)	Please check that this question paper contains **15** printed pages.
(II)	Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
(III)	Please check that this question paper contains **40** questions.
(IV)	**Please write down the Serial Number of the question in the answer-book before attempting it.**
(V)	15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

MATHEMATICS (STANDARD)

*Time allowed : **3** hours* *Maximum Marks : **80***

General Instructions :

Read the following instructions very carefully and strictly follow them :

(i) *This question paper comprises **four** sections – A, B, C and D.*

*This question paper carries 40 questions. **All** questions are compulsory.*

(ii) ***Section A** – Question no. **1** to **20** comprises of **20** questions of **one** mark each.*

(iii) ***Section B** – Question no. **21** to **26** comprises of **6** questions of **two** marks each.*

(iv) ***Section C** – Question no. **27** to **34** comprises of **8** questions of **three** marks each.*

(v) ***Section D** – Question no. **35** to **40** comprises of **6** questions of **four** marks each.*

(vi) *There is no overall choice in the question paper. However, an internal choice has been provided in 2 questions of one mark, 2 questions of two marks, 3 questions of three marks and 3 questions of four marks. You have to attempt only **one** of the choices in such questions.*

(vii) *In addition to this, separate instructions are given with each section and question, wherever necessary.*

(viii) *Use of calculators is not permitted.*

Section – A

Question numbers **1** to **10** are multiple choice questions of **1** mark each. Select the correct option.

1. The sum of exponents of prime factors in the prime-factorisation of 196 is

(a) 3 (b) 4 (c) 5 (d) 2

2. Euclid's division Lemma states that for two positive integers a and b, there exists unique integer q and r satisfying a = bq + r, and

3. The zeroes of the polynomial $x^2 - 3x - m(m + 3)$ are

(a) m, m + 3 (b) −m, m + 3 (c) m, −(m + 3) (d) −m, −(m + 3)

4. The value of k for which the system of linear equations $x + 2y = 3$, $5x + ky + 7 = 0$ is inconsistent is

(a) $-\frac{14}{3}$ (b) $\frac{2}{5}$ (c) 5 (d) 10

5. The roots of the quadratic equation $x^2 - 0.04 = 0$ are

(a) ± 0.2 (b) ± 0.02 (c) 0.4 (d) 2

6. The common difference of the A.P. $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}$, ... is

(a) 1 (b) $\frac{1}{p}$ (c) −1 (d) $-\frac{1}{p}$

7. The n^{th} term of the A.P. a, 3a, 5a, ... is

(a) na (b) (2n − 1) a (c) (2n + 1) a (d) 2na

8. The point P on x-axis equidistant from the points A(−1, 0) and B(5, 0) is

(a) (2, 0) (b) (0, 2) (c) (3, 0) (d) (2, 2)

9. The co-ordinates of the point which is reflection of point (−3, 5) in x-axis are

(a) (3, 5) (b) (3, −5) (c) (−3, −5) (d) (−3, 5)

10. If the point P (6, 2) divides the line segment joining A(6, 5) and B(4, y) in the ratio 3 : 1, then the value of y is

(a) 4 (b) 3 (c) 2 (d) 1

In Q. Nos. **11** to **15,** fill in the blanks. Each question is of 1 mark.

11. In fig. 1, MN || BC and AM : MB = 1 : 2, then

$\frac{ar(\ AMN)}{ar(\ ABC)}$ =_____.

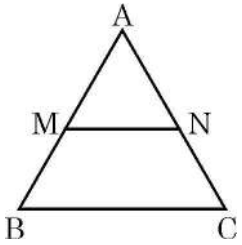


Fig.-1

12. In given Fig. 2, the length PB = _____cm.

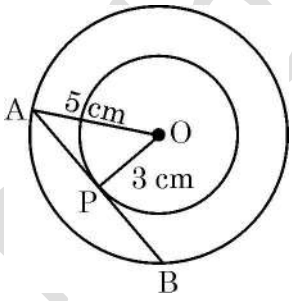


Fig.-2

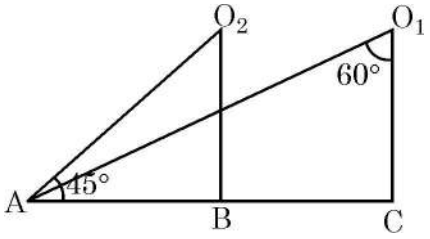
13. In ABC, AB = $6\sqrt{3}$ cm, AC = 12 cm and BC = 6 cm, then B =_____.

OR

Two triangles are similar if their corresponding sides are_____.

14. The value of (tan 1º tan 2º …… tan 89º) is equal to _____.

15. In fig. 3, the angles of depressions from the observing positions O_1 and O_2 respectively of the object A are_____, _____.



Q. Nos. **16** to **20** are short answer type questions of 1 mark each.

16. If $\sin A + \sin^2 A = 1$, then find the value of the expression $(\cos^2 A + \cos^4 A)$.

17. In fig. 4 is a sector of circle of radius 10.5 cm. Find the perimeter of the sector. Take $= \frac{22}{7}$

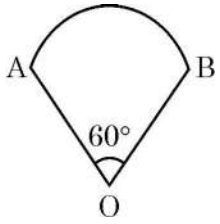


Fig.-4

18. If a number x is chosen at random from the numbers –3, –2, –1, 0, 1, 2, 3, then find the probability of $x^2 < 4$.

OR

What is the probability that a randomly taken leap year has 52 Sundays ?

19. Find the class-marks of the classes 10-25 and 35-55.

20. A die is thrown once. What is the probability of getting a prime number.

Section – B

Q. Nos. **21** to **26** carry **2** marks each.

21. A teacher asked 10 of his students to write a polynomial in one variable on a paper and then to handover the paper. The following were the answers given by the students :

$2x + 3$, $3x^2 + 7x + 2$, $4x^3 + 3x^2 + 2$, $x^3 + \sqrt{3x} + 7$, $7x + \sqrt{7}$, $5x^3 - 7x + 2$, $2x^2 + 3 - \frac{1}{x}$, $5x - \frac{1}{2}$, $ax^3 + bx^2 + cx + d$, $x + \frac{1}{x}$.

Answer the following questions :

(i) How many of the above ten, are not polynomials ?

(ii) How many of the above ten, are quadratic polynomials ?

22. In fig. 5, ABC and DBC are two triangles on the same base BC. If AD intersects BC at O, show that

$$\frac{\text{ar}(\text{ABC})}{\text{ar}(\text{DBC})} = \frac{\text{AO}}{\text{DO}}$$

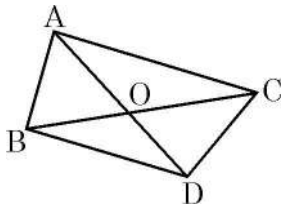


Fig.-5

OR

In fig. 6, if AD BC, then prove that $AB^2 + CD^2 = BD^2 + AC^2$.

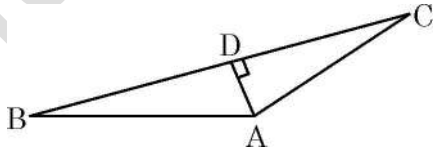


Fig.-6

23. Prove that $1 + \frac{\cot^2}{1 + \text{cosec}} = \text{cosec}$

OR

Show that $\tan^{4-} + \tan^{2-} = \sec^{4-} - \sec^{2-}$

24. The volume of a right circular cylinder with its height equal to the radius $\frac{1}{}$

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is 25 $_7$ cm . Find the height of the cylinder. (Use = $_7$)

25. A child has a die whose six faces show the letters as shown below :

A	B	C	D	E	A

The die is thrown once. What is the probability of getting (i) A, (ii) D ?

26. Compute the mode for the following frequency distribution :

Size of items (in cm)	0 – 4	4 – 8	8 – 12	12 – 16	16 – 20	20 – 24	24 – 28
Frequency	5	7	9	17	12	10	6

Section – C

Q Nos. **27** to **34** carry **3** marks each.

27. If $2x + y = 23$ and $4x - y = 19$, find the value of $(5y - 2x)$ and $\frac{}{x} - 2$.

OR

Solve for x : $\frac{1}{x+4} - \frac{1}{x+7} = \frac{11}{30}$, $x \neq -4, 7$.

28. Show that the sum of all terms of an A.P. whose first term is a, the second term is b and the last term is c is equal to $\frac{(a + c)(b + c - 2a)}{2(b - a)}$

OR

Solve the equation :

1+4+7+10+....+x=287

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29. In a flight of 600 km, an aircraft was slowed down due to bad weather. The average speed of the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. Find the duration of flight.

30. If the mid-point of the line segment joining the points A(3, 4) andB(k, 6) is P (x, y) and x + y – 10 = 0, find the value of k.

OR

Find the area of triangle ABC with A (1, –4) and the mid-points of sides through A being (2, –1) and (0, –1).

31. In Fig. 7, if ABC ~ DEF and their sides of lengths (in cm) are marked along them, then find the lengths of sides of each triangle.

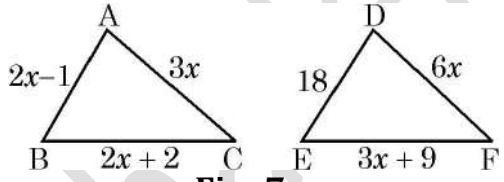

Fig.-7

32. If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R, respectively, prove that

AQ = $\frac{1}{2}$ (BC + CA + AB)

33. If sin $^{-}$ + cos $^{-}$ = $\sqrt{2}$, prove that tan $^{-}$ + cot $^{-}$ = 2.

34. The area of a circular play ground is 22176 cm ^{2}. Find the cost of fencing this ground at the rate of ` 50 per metre.

Section – D

Q. Nos. **35** to **40** carry **4** marks each.

35. Prove that $\sqrt{5}$ is an irrational number.

36. It can take 12 hours to fill a swimming pool using two pipes. If the pipe of

larger diameter is used for four hours and the pipe of smaller diameter for 9 hours, only half of the pool can be filled. How long would it take for eachpipe to fill the pool separately ?

37. Draw a circle of radius 2 cm with centre O and take a point P outside the circle such that OP = 6.5 cm. From P, draw two tangents to the circle.

OR

Construct a triangle with sides 5 cm, 6 cm and 7 cm and then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the first triangle.

38. From a point on the ground, the angles of elevation of the bottom and the top of a tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.

39. Find the area of the shaded region in fig. 8, if PQ = 24 cm, PR = 7 cm and O is the centre of the circle.

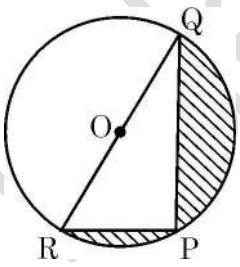

Fig.-8

OR

Find the curved surface area of the frustum of a cone, the diameters of whose circular ends are 20 m and 6 m and its height is 24 m.

40. The mean of the following frequency distribution is 18. The frequency f in the class interval 19 – 21 is missing. Determine f.

Class interval	11 – 13	13 – 15	15 – 17	17 – 19	19 – 21	21 – 23	23 – 25
Frequency	3	6	9	13	f	5	4

OR

The following table gives production yield per hectare of wheat of 100 farms of a village :

Production yield	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65	65 – 70
No. of farms	4	6	16	20	30	24

Change the distribution to a 'more than' type distribution and draw its ogive