

**OMT-101**

**ASSIGNMENT BOOKLET**

**Bachelor's Preparatory Programme  
Preparatory Course in General Mathematics  
(Valid from 1<sup>st</sup> January, 2019 to 31<sup>st</sup> December, 2019)**



**School of Sciences  
Indira Gandhi National Open University  
Maidan Garhi, New Delhi  
(For January 2019 cycle)**

Dear Student,

Please read the section on assignments in the Programme Guide for elective Courses that we sent you after your enrolment. A weightage of 30%, as you are aware, has been earmarked for continuous evaluation, **which would consist of one tutor-marked assignment** for this course. The assignment is in this booklet.

### Instructions for Formatting Your Assignments

Before attempting the assignment please read the following instructions carefully.

1. On top of the first page of your answer sheet, please write the details exactly in the following format:

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**ROLL NO. :**.....

**NAME :**.....

**ADDRESS :**.....

.....

.....

**COURSE CODE :** .....

**COURSE TITLE :** .....

**STUDY CENTRE :** .....

**DATE**.....

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**PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.**

2. Use only foolscap size writing paper (but not of very thin variety) for writing your answers.
3. Leave a 4 cm margin on the left, top and bottom of your answer sheet.
4. Your answers should be precise.
5. While solving problems, clearly indicate which part of which question is being solved.
6. This assignment is to be submitted to the Study Centre as per the schedule made by the study centre. **Answer sheets received after the due date shall not be accepted.**
7. This assignment is valid only up to 31<sup>st</sup> December, 2019. If you fail in this assignment or fail to submit it by 31<sup>st</sup> December, 2019, then you need to get the assignment for the year 2020 and submit it as per the instructions given in the Programme Guide.
8. **You cannot fill the Exam form for this course till you have submitted this assignment. So solve it and submit it to your study centre at the earliest.**
9. **We strongly suggest that you retain a copy of your answer sheets.**

We wish you good luck.

## Assignment

Course Code: OMT-101  
Assignment Code: OMT-101/TMA/2019  
Maximum Marks: 100

### Section A

1. a) Give two examples of daily life where you have seen use of symbols. (2)
  - b) Which of the following sentences are unambiguous? Give reasons for your answers. (4)
    - i) Wild life habitats are shrinking in India.
    - ii) Dogs live with humans.
    - iii) The moon revolves around the sun.
    - iv) Kids enjoy watching T.V.
  - c) What do you think how rational numbers have evolved? Explain with the help of examples. Do you find rational numbers incomplete? Explain. (4)
2. a) Evaluate the following using number line (2)
    - i)  $(-2) + (-6)$
    - ii)  $3 \times 2$
  - b) Compute the LCM and HCF of the numbers 20, 45, 33 and 84. (3)
  - c) Write three rational numbers between  $\frac{3}{4}$  and  $\frac{8}{9}$  such that the difference between the successive numbers is the same. Obtain a general formula for  $n$  such numbers between 0 and 1. What can be the maximum value of  $n$  in the formula? Justify your answer. (5)
3. a) Write the Roman equivalents for the following decimal numbers. (2)

59, 68, 101, 189

- b) The rates of different vegetables on a vegetable shop were given as follows:

| Vegetable | Rate(per kg) |
|-----------|--------------|
| Brinjal   | 15           |
| Carrot    | 35           |
| Onion     | 48           |
| Potato    | 24           |
| Tomato    | 18           |
| Capsicum  | 34           |

Reena brings with her Rs 140/- to buy 200g brinjals, 250g carrots, 1.75kg Onions, 1.25kg potatoes, 300g tomatoes and 650g capsicum. Does she has enough money to buy the vegetables? If so, how much is left over? If not, how much more money would she need? (5)

- c) Solve the following equations (4)
  - i)  $1512^{2/3} = 36x^{2/3}$
  - ii)  $(2\sqrt{3} + \sqrt{2})(2\sqrt{2} - \sqrt{3}) + 2 = \sqrt{6}x$

- d) Does there exist a rational number  $x$  such that  $(14x + 1)x = 3$ ? If yes, find all such numbers. If no, give reasons. (4)
4. a) i) If the sum of the cubes of first  $n$  natural numbers is 25502500, then find the value of  $n$ . (2)  
 ii) How many terms are there in the sequence 3, 21, 147, ..., 50421? (2)
- b) Find the sum of the series: (3)

$$10 + 1 + 8 + 2 + 6 + 3 + \dots + 10(-10)$$

- c) The mobile numbers of a telecom company begin with the digits 932 and do not end in 9. How many phone numbers can it provide at the most? (3)
5. a) Consider two right angle triangles with sides  $a, b, c$  and  $A, B, C$ , respectively. If  $a/A = b/B$ , then show that  $c/C = a/A$ . Does the result hold when the triangles are not right angle? Justify your answer. (3)
- b) What is the difference between a hyperbola and a hyperboloid? Explain with examples. (2)
- c) Give two English alphabets which have reflection symmetry. Also find two letters which are not symmetric about any line. (2)
- d) Find the relation between the number of faces  $F$ , number of vertices  $V$  and the number of edge  $E$  of the Platonic solids. (3)
6. a) The scale of the road map of a city is  $1\text{cm} = 922\text{m}$ . If the distance between the places  $A$  and  $B$  in the map is 6.5cm, find the actual distance between them. (2)
- b) A sphere is put inside a cube in such a way that it touches each face of the cube from inside. If the side of the cube is 6cm, find the volume of the space between the sphere and the cube. (2)
- c) Find the equation of the line with slope  $4/3$  and which passes through the mid-point of the line segment joining the points  $(3, -1)$  and  $(1, 2)$ . Represent this line geometrically by taking at least three points on it. (3)
- d) Find the cost of purchasing 240 shares of a company, each of par value Rs 120 quotes at Rs 150 each in the market, from the shareholder. Also find the gain to the new shareholder if he sells each share at a premium of Rs. 200. (3)
7. a) Puneet purchased 36 bananas for Rs 150. Six of them were rotten which he threw them away. He sold three-fifth of the remaining bananas at a profit of 15% and the rest at a loss of 3%. Find his profit or loss in percent. (4)
- b) The following data represents the number of vehicles of 24 households in a colony.

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| 2 | 4 | 6 | 5 | 7 | 0 | 3 | 2 |
| 5 | 5 | 7 | 4 | 5 | 3 | 4 | 0 |
| 2 | 6 | 4 | 4 | 3 | 3 | 2 | 1 |

Answer the following questions on the basis of the data given above. (4)

- i) What is the maximum and minimum number of vehicles in a household?
- ii) Using the classes  $0 - 2, 2 - 4, 4 - 6, 6 - 8$  draw up the frequency distribution of the number of vehicles.

- iii) How many households have vehicles more than 6?
- iv) How many households have vehicles between 4 and 6?
- c) The following table shows the number of endangered and threatened species surveyed in a year. Find the probability that
  - i) a randomly chosen species from the table is a reptile
  - ii) a randomly chosen species from the table among the endangered species is a reptile. (4)

|                   | <b>Mammals</b> | <b>Reptiles</b> | <b>Birds</b> | <b>Amphibians</b> | <b>Others</b> |
|-------------------|----------------|-----------------|--------------|-------------------|---------------|
| <b>Endangered</b> | 60             | 79              | 19           | 12                | 150           |
| <b>Threatened</b> | 9              | 11              | 25           | 7                 | 78            |

- d) Identify which pairs of events  $A$  and  $B$  are mutually exclusive and which ones are not mutually exclusive.
  - i)  $A$ : Getting an ace in picking one card from a deck.  
 $B$ : Getting a club in picking one card from a deck.
  - ii)  $A$ : Getting an even number up on a die.  
 $B$ : Getting 4 or 6 up on a die.
  - iii)  $A$ : Picking a number from the set  $\{1, 2, 3, \dots, 100\}$  and getting it divisible by 5.  
 $B$ : Picking a number from the set  $\{1, 2, 3, \dots, 100\}$  and getting it indivisible by 5.

## Section -B

The following 20 questions are multiple choice types. Only one of the four alternative given in each is correct. You have to identify the correct answer. Each question is worth **1mark**. You have to give the answer in the **OMR sheet attached with this** and submit it along with your answers to the other question, for evaluation. Please read the instructions given for filling the OMR sheet, carefully, before you start filling your answers. **(Please note that is the format appearing in your Term End Examination.**

1. Which of the following is a rational number?
  - 1) The length of the diagonal of a square with unit side.
  - 2) The area of a circle with radius  $\frac{1}{2}$ .
  - 3) Cube root of 3
  - 4) The length of the hypotenuse of a right angle triangle with the lengths of the other sides as 3 and 4.
  
2.  $(x+a)(x+b)(x+c)$  is equal to
  - 1)  $x^3 + abc$
  - 2)  $(x+abc)^3$
  - 3)  $x^3 + (a+b+c)x + abc$
  - 4)  $x^3 + (a+b+c)x^2 + (ab+bc+ca)x + abc$
  
3. If  $a$  and  $b$  are  $n$ th and  $n+1$ th fibonacci numbers respectively then  $(n+5)$ th fibonacci number is
  - 1)  $3a+5b$
  - 2)  $a+b$
  - 3)  $5a+5b$
  - 4)  $a+b+5$
  
4. Which one of the following is **not a solution** of the equation  $2x - 7y - 4 = 0$ ?
  - 1)  $(\frac{4}{3}, -\frac{4}{3})$
  - 2)  $(\frac{7}{2}, \frac{3}{7})$
  - 3)  $(\frac{61}{6}, \frac{7}{3})$
  - 4)  $(\frac{21}{4}, \frac{3}{2})$
  
5. If the 19th term of an A.P. is 238 and the common difference is 13, then its first term is
  - 1) 43
  - 2) 4
  - 3) 3.5
  - 4) 30

6. If  $C(n,3) = 2C(n,4)$ , then  $n$  is
- 1) 4
  - 2) 6
  - 3) 5
  - 4) 8
7. Dimension of a tetrahedron is
- 1) 4
  - 2) 5
  - 3) 3
  - 4) 8
8. Which one of the following is not a postulate for geometry?
- 1) For any two points there is exactly one line that contains them.
  - 2) For any three non-collinear points is exactly one plane that contains them.
  - 3) For any pair of parallel lines there is exactly one plane that contains them.
  - 4) For any two points there is a unique positive number which is the distance between them.
9. Sum of the angles of a heptagon is:
- 1)  $3560^\circ$
  - 2)  $900^\circ$
  - 3)  $1080^\circ$
  - 4)  $720^\circ$
10. A parallelogram has
- 1) rotational symmetry
  - 2) reflection symmetry
  - 3) both rotational and reflection symmetry
  - 4) no symmetry
11. Which one of the following is **not** a conic-section?
- 1) ellipse
  - 2) parabola
  - 3) hyperbola
  - 4) square
12. The area of a rhombus is  $180 \text{ cm}^2$ . If one of the diagonal is 12cm long, then the length of the other diagonal (in cm) is

- 1) 15
  - 2) 30
  - 3) 18
  - 4) 25
13. Which one of the following is in the shape of a sphere?
- 1) An orange
  - 2) A football
  - 3) An apple
  - 4) A cricket ball
14. If 6 cubes each of side 3 cm are joined end to end, then the surface area (in  $\text{cm}^2$ ) of the cuboid so formed is
- 1) 200
  - 2) 250
  - 3) 18
  - 4) 240
15. The area of the triangle with vertices  $(1, 1)$ ,  $(2, 2)$  and  $(-3, 1)$  is
- 1) 1
  - 2) 2
  - 3) 3
  - 4) 4
16. Let P and Q be two points such that their abscissas are equal. Then which of the following is true?
- 1) The line joining P and Q is parallel to the x-axis.
  - 2) The line joining P and Q is parallel to the y-axis.
  - 3) The line joining P and Q passes through the origin.
  - 4) The line joining P and Q makes an angle of  $30^\circ$  with the x-axis and cuts the y-axis at  $(0, 4)$
17. The simple interest on ₹4000 at 9.25% per annum in 6 years will be
- 1) ₹2222
  - 2) ₹2220
  - 3) ₹2500
  - 4) ₹2450
18. The mean deviation of the data, 6,5,5,-1,6,3,4,9,8 is
- 1) 2



- 2) 3
- 3) 4
- 4) 5

19. The probability that a randomly chosen two-digit positive integer is a multiple of 3 is

- 1)  $\frac{2}{3}$
- 2)  $\frac{1}{3}$
- 3)  $\frac{2}{5}$
- 4)  $\frac{3}{4}$

20. If  $A, B$  and  $C$  are three independent events and  $P(A) = 0.3, P(B) = 0.5$  and  $P(C) = 0.8$ , then  $P(A^c \cup B^c \cup C^c)$  is

- 1) 0.12
- 2) 0.88
- 3) 0
- 4) 0.48

## INSTRUCTIONS FOR MARKING IN THE OMR RESPONSE SHEET

1. Use only H.B. pencil for filling the response sheet
2. Mark your answers in the proper column
3. Enter your Enrolment no., year, month, course code and examination code in the respective boxes given for that as shown below. For example if your enrolment number is 071645498, then you need to first write the enrolment number as shown in the box titled enrolment no., given below. Then you have to darken each circle corresponding to each digit appearing in the enrolment number. Suppose, for example, the leftmost digit is 0. So we darken the first 0 in the box. Next digit is 7. Then we select the row containing 7 and darken the '7' in the second column. Similarly you can fill the other digits.

Note that the **Course Code** you have to fill in the OMR sheet is the **computer code** for this course which is **1114**. This is different from the course code given in the programme guide or blocks for this course.

| ENROLMENT NUMBER |   |   |   |   |   |   |   |   |
|------------------|---|---|---|---|---|---|---|---|
| 0                | 7 | 1 | 6 | 4 | 5 | 4 | 9 | 8 |
| ●                | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| ①                | ① | ● | ① | ① | ① | ① | ① | ① |
| ②                | ② | ② | ② | ② | ② | ② | ② | ② |
| ③                | ③ | ③ | ③ | ③ | ③ | ③ | ③ | ③ |
| ④                | ④ | ④ | ④ | ● | ④ | ● | ④ | ④ |
| ⑤                | ⑤ | ⑤ | ⑤ | ⑤ | ● | ⑤ | ⑤ | ⑤ |
| ⑥                | ⑥ | ⑥ | ● | ⑥ | ⑥ | ⑥ | ⑥ | ⑥ |
| ⑦                | ● | ⑦ | ⑦ | ⑦ | ⑦ | ⑦ | ⑦ | ⑦ |
| ⑧                | ⑧ | ⑧ | ⑧ | ⑧ | ⑧ | ⑧ | ● | ⑧ |
| ⑨                | ⑨ | ⑨ | ⑨ | ⑨ | ⑨ | ⑨ | ● | ⑨ |

| COURSE CODE |   |   |   |
|-------------|---|---|---|
| 1           | 1 | 1 | 4 |
| ○           | ○ | ○ | ○ |
| ●           | ● | ● | ① |
| ②           | ② | ② | ② |
| ③           | ③ | ③ | ③ |
| ④           | ④ | ④ | ● |
| ⑤           | ⑤ | ⑤ | ⑤ |
| ⑥           | ⑥ | ⑥ | ⑥ |
| ⑦           | ⑦ | ⑦ | ⑦ |
| ⑧           | ⑧ | ⑧ | ⑧ |
| ⑨           | ⑨ | ⑨ | ⑨ |

| YEAR |   |   |   |
|------|---|---|---|
| 2    | 0 | 0 | 7 |
| ○    | ● | ● | ○ |
| ①    | ① | ① | ① |
| ●    | ② | ② | ② |
| ③    | ③ | ③ | ③ |
| ④    | ④ | ④ | ④ |
| ⑤    | ⑤ | ⑤ | ⑤ |
| ⑥    | ⑥ | ⑥ | ⑥ |
| ⑦    | ⑦ | ⑦ | ● |
| ⑧    | ⑧ | ⑧ | ⑧ |
| ⑨    | ⑨ | ⑨ | ⑨ |

| EXAMINATION CENTRE CODE |   |   |   |
|-------------------------|---|---|---|
| 1                       | 2 | 4 | 6 |
| ○                       | ○ | ○ | ○ |
| ●                       | ① | ① | ① |
| ②                       | ● | ② | ② |
| ③                       | ③ | ③ | ③ |
| ④                       | ④ | ● | ④ |
| ⑤                       | ⑤ | ⑤ | ⑤ |
| ⑥                       | ⑥ | ⑥ | ● |
| ⑦                       | ⑦ | ⑦ | ⑦ |
| ⑧                       | ⑧ | ⑧ | ⑧ |
| ⑨                       | ⑨ | ⑨ | ⑨ |

| MONTH |   |
|-------|---|
| 0     | 6 |
| ●     | ○ |
| ①     | ① |
|       | ② |
|       | ③ |
|       | ④ |
|       | ⑤ |
|       | ● |
|       | ⑦ |
|       | ⑧ |
|       | ⑨ |

4. For filling the correct choice for the multiple choice questions, do as illustrated in the following example.  
Suppose Question 13 is as given below:

**Q.No. 13.:** Which one of the following is **not** an integer.

- (1)  $-1$  (2)  $\sqrt{4}$   
 (3)  $0.5$  (4)  $0$

Suppose your answer to the question is “0.5” which is given in option no. “3”. Then you have to select the column against no. 13 in the boxes given below and write 3 in the box below “13” and shade the circle numbered 3 in that as shown below. If your answer is such that none of the 4 options are correct, then select 0.

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 |

|   |   |   |   |    |
|---|---|---|---|----|
| 6 | 7 | 8 | 9 | 10 |
| 0 | 0 | 0 | 0 | 0  |
| 1 | 1 | 1 | 1 | 1  |
| 2 | 2 | 2 | 2 | 2  |
| 3 | 3 | 3 | 3 | 3  |
| 4 | 4 | 4 | 4 | 4  |

|    |    |          |    |    |
|----|----|----------|----|----|
| 11 | 12 | 13       | 14 | 15 |
|    |    | <b>3</b> |    |    |
| 0  | 0  | 0        | 0  | 0  |
| 1  | 1  | 1        | 1  | 1  |
| 2  | 2  | 2        | 2  | 2  |
| 3  | 3  | ●        | 3  | 3  |
| 4  | 4  | 4        | 4  | 4  |

|    |    |    |    |    |
|----|----|----|----|----|
| 16 | 17 | 18 | 19 | 20 |
| 0  | 0  | 0  | 0  | 0  |
| 1  | 1  | 1  | 1  | 1  |
| 2  | 2  | 2  | 2  | 2  |
| 3  | 3  | 3  | 3  | 3  |
| 4  | 4  | 4  | 4  | 4  |

**OMR Response Sheet**  
(For writing answers to multiple choice questions)

This page is to be torn off and after filling the relevant boxes attach it along with your answers to other questions in the assignment. **This is to be submitted at the study centre for evaluation.**

| ENROLMENT NUMBER |   |   |   |   |   |   |   |   |
|------------------|---|---|---|---|---|---|---|---|
|                  |   |   |   |   |   |   |   |   |
| 0                | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1                | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2                | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3                | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 4                | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5                | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 6                | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 7                | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| 8                | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 9                | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |

| COURSE CODE |   |   |   |
|-------------|---|---|---|
|             |   |   |   |
| 0           | 0 | 0 | 0 |
| 1           | 1 | 1 | 1 |
| 2           | 2 | 2 | 2 |
| 3           | 3 | 3 | 3 |
| 4           | 4 | 4 | 4 |
| 5           | 5 | 5 | 5 |
| 6           | 6 | 6 | 6 |
| 7           | 7 | 7 | 7 |
| 8           | 8 | 8 | 8 |
| 9           | 9 | 9 | 9 |

| YEAR |   |   |   |
|------|---|---|---|
|      |   |   |   |
| 0    | 0 | 0 | 0 |
| 1    | 1 | 1 | 1 |
| 2    | 2 | 2 | 2 |
| 3    | 3 | 3 | 3 |
| 4    | 4 | 4 | 4 |
| 5    | 5 | 5 | 5 |
| 6    | 6 | 6 | 6 |
| 7    | 7 | 7 | 7 |
| 8    | 8 | 8 | 8 |
| 9    | 9 | 9 | 9 |

| EXAMINATION CENTRE CODE |   |   |   |
|-------------------------|---|---|---|
|                         |   |   |   |
| 0                       | 0 | 0 | 0 |
| 1                       | 1 | 1 | 1 |
| 2                       | 2 | 2 | 2 |
| 3                       | 3 | 3 | 3 |
| 4                       | 4 | 4 | 4 |
| 5                       | 5 | 5 | 5 |
| 6                       | 6 | 6 | 6 |
| 7                       | 7 | 7 | 7 |
| 8                       | 8 | 8 | 8 |
| 9                       | 9 | 9 | 9 |

| MONTH |   |
|-------|---|
|       |   |
| 0     | 0 |
| 1     | 1 |
|       | 2 |
|       | 3 |
|       | 4 |
|       | 5 |
|       | 6 |
|       | 7 |
|       | 8 |
|       | 9 |

**ANSWERS TO MULTIPLE CHOICE QUESTIONS**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
|   |   |   |   |   |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 | 4 |

| 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|----|
|   |   |   |   |    |
| 0 | 0 | 0 | 0 | 0  |
| 1 | 1 | 1 | 1 | 1  |
| 2 | 2 | 2 | 2 | 2  |
| 3 | 3 | 3 | 3 | 3  |
| 4 | 4 | 4 | 4 | 4  |

| 11 | 12 | 13 | 14 | 15 |
|----|----|----|----|----|
|    |    |    |    |    |
| 0  | 0  | 0  | 0  | 0  |
| 1  | 1  | 1  | 1  | 1  |
| 2  | 2  | 2  | 2  | 2  |
| 3  | 3  | 3  | 3  | 3  |
| 4  | 4  | 4  | 4  | 4  |

| 16 | 17 | 18 | 19 | 20 |
|----|----|----|----|----|
|    |    |    |    |    |
| 0  | 0  | 0  | 0  | 0  |
| 1  | 1  | 1  | 1  | 1  |
| 2  | 2  | 2  | 2  | 2  |
| 3  | 3  | 3  | 3  | 3  |
| 4  | 4  | 4  | 4  | 4  |