Fundamental of Mathematics - II

Additional Problems For Self Practice (APSP)

PART - I : PRACTICE TEST PAPER

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

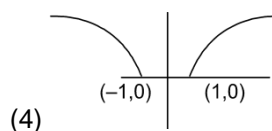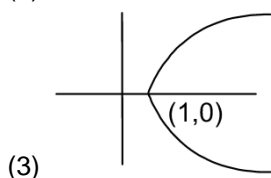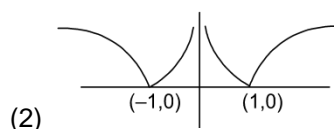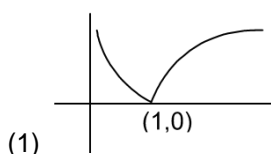**Max. Marks : 120**   **Max. Time : 1 Hr.**

Important Instructions :

1. The test is of **1 hour** duration and max. marks 120.

2. The test consists **30** questions, **4 marks** each.

3. Only one choice is correct **1 mark** will be deducted for incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

4. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 3 above.

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1. For a real number x, let [x] denotes the integral part of x. Then find value of

   $$\left[\frac{3}{5}\right]+\left[\frac{3}{5}+\frac{1}{10}\right]+\left[\frac{3}{5}+\frac{2}{10}\right].......\left[\frac{3}{5}+\frac{9}{10}\right]$$

   (1) 6   (2) 5   (3) 7   (4) 9

2. If [(x – 3) +[4]] = 5, (where [.] denotes greatest integer function) then value of x is
   (1) x ∈ [4, 5)   (2) x ∈ (3, 5)   (3) x ∈ (3, 5)   (4) x ∈ (2, 6)

3. Find number of solutions of |x – 3| + |x – 4| + |x – 5| = 16
   (1) 2   (2) 4   (3) 1   (4) 0

4. Number of integers satisfying |x – 3| ≤ 2 are
   (1) 5   (2) 4   (3) 3   (4) 2

5. Number of natural numbers satisfying –6 < [x + 2] < 1 (where [.] denotes greatest integer) is/are
   (1) 6   (2) 3   (3) 1   (4) 0

6. If sgn (x_2 – 5x + 6) = 1, then x belongs to
   (1) (2, 3)   (2) [2, 3]   (3) (–∞, 2] ∪ [3, ∞)   (4) (–∞, 2) ∪ (3, ∞)

7. The minimum value of f(x) = |x – 1| + |x – 2| + |x – 3| is :
   (1) 5   (2) 3   (3) 2   (4) 1

8. Number of distinct values of x such that ||x – 2| – 5| = 3
   (1) 2   (2) 4   (3) 3   (4) 1

9. Complete solution set of |2x – 1| + |x + 6| ≤ |x – 7| is

   (1) $x \in \left(-5, \frac{3}{2}\right]$ (2) $x \in \left[-6, \frac{1}{2}\right]$ (3) $x \in \left(\frac{1}{2}, \infty\right)$ (4) (–∞, –6]

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10. Graph of $|y| = \ell nx$

(1)

(2)

(3)

(4)

11. The value of $[2e] + [\pi] + \{-\pi\}$ (where [.] denotes greatest integer function {.} denotes fractional part function) is

(1) $12 + \pi$ (2) $12 - \pi$ (3) $12 + 2\pi$ (4) $8 - \pi$

12. Maximum value of $f(x) = |x + 2| - 2|x - 1|$ is :

(1) 3 (2) 6 (3) 9 (4) 12

13. Consinder the equation $|x| + |x-3| = \lambda$

(1) for $\lambda = 0$, the equation has 3 solutions (2) for $\lambda = 6$, the equation has 2 solutions

(3) for $\lambda = 1/2e$, the equation has 2 solutions (4) for $\lambda = \pi/2$, the equation has 2 solutions

14. Complete solutions set of $\left(\dfrac{1}{3}\right)^{\sqrt{x+2}} > 3_{-x}$

(1) $(3, \infty)$ (2) $(4, \infty)$ (3) $(2, \infty)$ (4) $(5, \infty)$

15. Complete solution set of $-1 < \{x\} < 3$, (where {.} denotes fractional part function) is

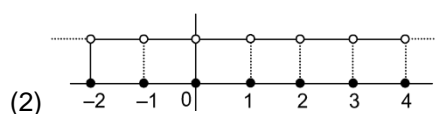(1) $x \in n + \dfrac{1}{3}$ (2) $x \in R$ (3) $x \in \varphi$ (4) can't say
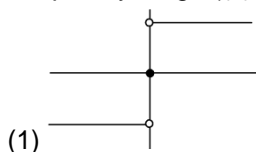
16. Number of real roots of $x_2 - 8|x| + 15 = 0$
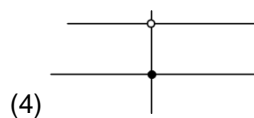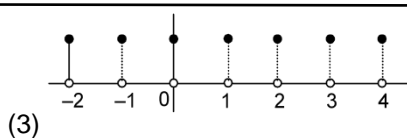
(1) 2 (2) 4 (3) 3 (4) 1

17. Number of integers satisfying $||x - 1| + 2| \le |3|$
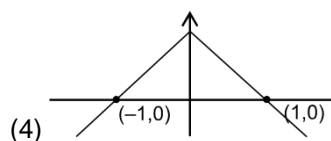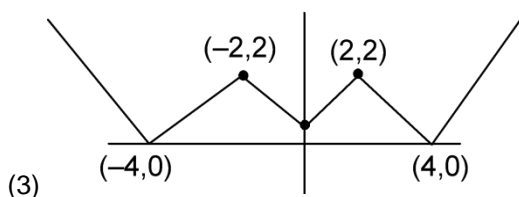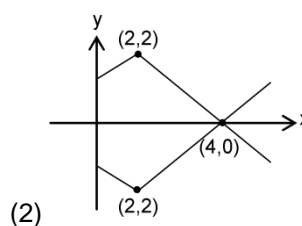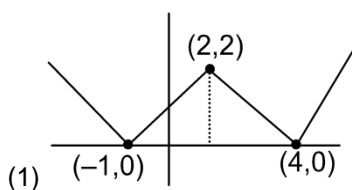
(1) 3 (2) 2 (3) 1 (4) 0

18. Graph of $y = $ sgn $(\{x\} + \{-x\})$ is (where {.} denotes fractional part function)

(1)

(2)

(3)

(4)

19. Given the graph of y = f(x) is, which of the following is graph of y = f(|x|)

(1)   (2)

(3)   (4)
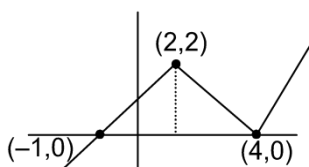
20. General solution of the equation $2\{x\}^2 + \{x\} - 1 = 0$ (where {.} denotes fractional part function) is

(1) $x \in n + \dfrac{1}{4}$ (2) $x \in n + \dfrac{1}{2}$ (3) $x \in n + \dfrac{1}{3}$ (4) None

21. If sgn ({x}) = 1 then x is (where {.} is fractional part function)

(1) R   (2) I   (3) R – I   (4) φ

22. If 4|4–2x| = 7, then the product of all the possible values of x is

(1) $\dfrac{32}{9}$ (2) $\dfrac{207}{64}$ (3) $\dfrac{163}{64}$ (4) 0

23. $\dfrac{|x+2|+x-1}{x+1} > 1$, Number of negative integers satisfying above relation

(1) 1   (2) 2   (3) 3   (4) 4

24. If complete solution of |x + 1| > |2x + 3| is (a, b) then a + 3b is :

(1) –6   (2) –4   (3) –2   (4) +2

25. Solution set of the inequality $\sqrt{6-x} > 2x - 1$ is

(1) $x \in \left(\dfrac{3 + \sqrt{89}}{8}, \infty \right)$ 　　(2) $x \in \left(\dfrac{1}{2}, \dfrac{3 + \sqrt{89}}{8} \right)$ 　　(3) $x \in \left(-\infty, -\dfrac{1}{2} \right)$ 　　(4) $x \in \left(-\infty, \dfrac{3 + \sqrt{89}}{8} \right)$

26. Number of integers satisfying $\sqrt{-x^2 + 6x - 5} > 8 - 2x$

(1) 2 　　　　　　(2) 3 　　　　　　(3) 4 　　　　　　(4) 1

27. If [x].{x} = 3 (where [.] denotes greatest integer function, and {.} is fractional part function) and $0 \le x \le 100$ then number of solutions x is equal to

(1) 0 　　　　　　(2) 3 　　　　　　(3) 95 　　　　　　(4) 96

28. Number of solutions of the equation [x] = 4x – [–x] (where [.] denotes greatest integer function)

(1) 1 　　　　　　(2) 2 　　　　　　(3) 3 　　　　　　(4) 4

29. If solution of $\left| \log_2 \left(\dfrac{x}{4} \right) \right| + 2\,|\log_2 x - 8\,| = 12$ are x_1 & x_2, then the value of $|x_1 - x_2|$ is

(1) 1028 　　　　　　(2) 1024 　　　　　　(3) 1020 　　　　　　(4) 1008

30. Choose the correct graph of $f(x) = [\ell nx] + [-\ell nx]$; $x \ge 1$, (where [.] denotes greatest integer function)

(1) 　　　　　　　　　　(2)

(3) 　　　　　　　　　　(4)

Practice Test (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

| Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

Fundamental of Mathematics - II

PART - II : PRACTICE QUESTIONS

1. The set of solution of equation $4[x] = x + \{x\}$ is (where [.] and { . } denotes greatest integer and fractional part function respectively) :

(1) $\{0\}$ (2) $\{0, 5/2\}$ (3) $(-2, 0)$ (4) $[-1, 0)$

2. If $|x| < 10$; $x \in I$ and $|y| < 10$; $y \in I$, then the minimum value for $x_2 - 2xy_2 + 1 + y_4$ is

(1) 1   (2) 10   (3) -8 (4) None of these

3. The number of real solutions of $1 + |e_x - 1| = e_x \ (e_x - 2)$ is

(1) 0   (2) 1   (3) 2   (4) 4

4. The equation $\left\| |x-1| + a \right| = 4$ can have atleast one real solution for x if a belongs to the interval

(1) $(-\infty, 4]$ (2) $(-\infty, -4]$ (3) $[-4, 4]$ (4) All of these

5. If $x \geq 0$ and $y \geq 0$, then the area bounded by the graph of $[x] + [y] = 2$ is (where [.] denotes greatest integer function)

(1) 4 sq. unit.   (2) 1 sq. unit   (3) 2 sq. unit   (4) 3 sq. unit

6. If graph of $y = f(x)$ where $f(x)$ is differentiable in $(-3,1)$, is as shown in the following figure
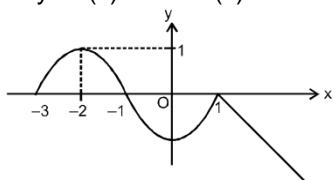
and $g(x) = \ell n(f(x))$, then the graph of $y = g(x)$ is

(1)

(2)

(3)

(4)
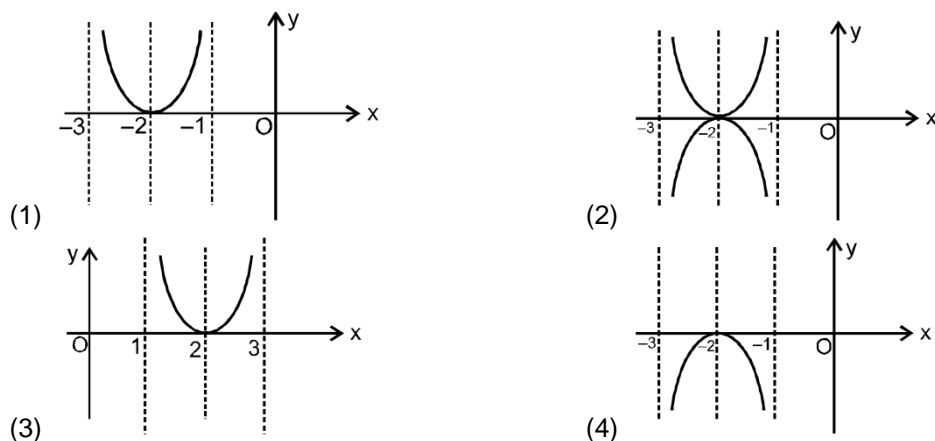
7. _ Number of integral values of x satisfying the equation

$|2x - 3| - |x^2 - 4x + 3| = |x^2 - 2x|$ is/are

(1) 0   (2) 5   (3) 4   (4) Infinite

8. If the number of solutions of

$|x - 1| + |x - 2| + |x - 3| + ...+ |x - 100| = 96x - k$ is infinite, then the value of k is

(1) 4650   (2) 4651   (3) 4652   (4) 4653

9. **STATEMENT 1 :** The equation $\sqrt{x + 3 - 4\sqrt{x-1}} + \sqrt{x + 8 - 6\sqrt{x-1}} = 1$ has more than two solutions

STATEMENT 2 : $\sqrt{x^2} = |x|$

(1) Both the statements are true.

(2) Statement-I is true, but Statement-II is false.

(3) Statement-I is false, but Statement-II is true.

(4) Both the statements are false.

Fundamental of Mathematics - II

APSP Answers

PART - I

1.	(1)	**2.**	(1)	**3.**	(1)	**4.**	(1)	**5.**	(4)	**6.**	(4)	**7.**	(3)
8.	(2)	**9.**	(2)	**10.**	(3)	**11.**	(2)	**12.**	(1)	**13.**	(2)	**14.**	(3)
15.	(2)	**16.**	(2)	**17.**	(1)	**18.**	(2)	**19.**	(3)	**20.**	(2)	**21.**	(3)
22.	(2)	**23.**	(2)	**24.**	(1)	**25.**	(4)	**26.**	(1)	**27.**	(4)	**28.**	(2)
29.	(3)	**30.**	(4)										

PART - II

1.	(1)	**2.**	(1)	**3.**	(2)	**4.**	(4)	**5.**	(4)	**6.**	(4)	**7.**	(3)
8.	(3)	**9.**	(1)										