

I PUC Basic Mathematics (75)

Midterm Examination

Scheme of Evaluation

PART - A

I. Answer all the MCQ's $10 \times 1 = 10$

(1). (b) 576

(2). (a) 6

(3). (a) $4^2 = 81$

(4). (c) 23

(5). (c) 130

(6). (a) 66%

(7). (b) $\pi/5$

(8). (c) 1

(9). (d) IV quadrant

(10). (b) $x+y=5$

II. Match the following $5 \times 1 = 5$

11. (a) - (i) 1

(b) - (v) 4

(c) - (vi) 5

(d) - (iii) 2

(e) - (x) 0

III

Fill in the blanks

5x1=5

12. 0

13. 1

14. $\frac{1}{15}$

15. $\frac{3}{4}$

16. $-\cos c$

PART-B

IV

Answer any six questions 6x2=12

17. $39-6=33, 48-4=44$
 $90-2=88$ } 1m

$33=11' \times 3', 44=11' \times 2^2$
 $88=11' \times 2^2$ } 1m

HCF is 11

18. $a^x = b$
 $a^{xy2} = b^{y2}$ } 1m

$a^{xy2} = c^2 = a$ } 1m.

$xy2=1$

19. $\log_2 x \left[1 + \frac{1}{2} \right] = 3$. — 1m

$\log_2 x = 2$

$x=4$

1m.

②

20 $T_4 = \frac{3}{4}$ $T_7 = \frac{2}{3}$ } 1m
 $d = \frac{1}{18}$ $a = 7/6$ } 1m
 $T_{10} = 3/5$ }

21 Average q new group $= \frac{12 \times 8 + 21}{13}$ } 2m.
 $= 9 \text{ years}$ }

22 $\sqrt{\frac{1+\cos A}{1-\cos A}} = \sqrt{\frac{(1+\cos A)^2}{\sin^2 A}}$ } 1m
 $= \frac{1}{\sin A} + \frac{\cos A}{\sin A}$ } 1m
 $= \csc A + \cot A$ }

23 $\cos A + \sin(270^\circ + A) = \sin(270^\circ - A) + \cos(180^\circ + A)$ } 2m
 $= \cos A - \cos A - \cos A + \cos A$
 $= 0$

24 A(3, -2) B(-1, a)
 $AB = \sqrt{(-1-3)^2 + (a+2)^2} = 5$ } 2m.
 $a = 1 \text{ or } a = -5$

25. $\sqrt{(x-4)^2 + (y-2)^2} = y.$
 $x^2 - 8x - 4y + 20 = 0$ } 2m.

26. PART-C
V answer any 5m questions $6 \times 3 = 18.$
 26 proof — 3m.

27 $2^x = y.$
 $y^2 - 6y + 8 = 0$ } 1m

Factorisation } 1m.

$x = 1$ or $x = 2$ } 1m.

28. $\log(a-b) = \frac{1}{2} \log(5ab)$ — 1m

$a-b = \sqrt{5ab}.$ — 1m

Squaring.

$a^2 + b^2 = 7ab.$ — 1m

29. $a = -2, a + 4d = -10.$

$d = -2.$

$A_1 = -4, A_2 = -6, A_3 = -8$ } 3m.

30. $A \rightarrow B = x \text{ km} = \frac{x}{10} \text{ hr}, B \rightarrow A = x = \frac{x}{15} \text{ hr}$

Average = $\frac{x+x}{\frac{x}{10} + \frac{x}{15}} = 12 \text{ kmph}$ } 3m

31.

$$a - d = 36^\circ$$

$$a - d + a + a + d = 180^\circ$$

$$a = 60^\circ$$

$$d = 24^\circ$$

 $\left. \begin{array}{l} \\ \end{array} \right\} 1m$
 $\left. \begin{array}{l} \\ \end{array} \right\} 1m$

The angles are $36^\circ = \pi/5$ radians

$$60^\circ = \frac{\pi}{3}$$

$$84^\circ = \frac{7\pi}{15}$$

 $\left. \begin{array}{l} \\ \\ \end{array} \right\} 1m$

32.

$$1 \cdot \left(\frac{\sqrt{3}}{2}\right)^2 \cdot (\sqrt{2})^2$$

$$\sqrt{3} + \frac{1}{\sqrt{3}}$$

$$= \frac{3\sqrt{3}}{8}$$

 $\left. \begin{array}{l} \\ \end{array} \right\} 2m$
 $\left. \begin{array}{l} \\ \end{array} \right\} 1m$

33.

$$x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) - 1m$$

$$= 4[1 - 7] + 1[7 + 5] + 2[-5 - 1] - 1m$$

$$= 0$$

 $\text{--- } 1m$

34.

$$PA^2 = 3PB^2$$

$$(x-5)^2 + y^2 = 3[(x+5)^2 + y^2]$$

$$x^2 + y^2 + 20x + 25 = 0$$

 $\left. \begin{array}{l} \\ \end{array} \right\} 2m$
 $\left. \begin{array}{l} \\ \end{array} \right\} 1m$

PART-D.

V

Answer any Four questions $4 \times 5 = 20$.

35.

$$1026 = 2^1 \times 3^3 \times 19^1 \quad \text{--- 1m}$$

$$\text{no of divisol} = 16. \quad \text{--- 2m}$$

$$\text{Sum of divisol} = 2400 \quad \text{--- 2m}$$

36

$$\frac{1}{1+a+b^{-1}} + \frac{1}{1+b+c^{-1}} + \frac{1}{1+c+a^{-1}}$$

$$= \frac{b}{b+ab+1} + \frac{1}{1+b+ab} + \frac{a}{a+ac+1}$$

$$= \frac{b}{b+ab+1} + \frac{1}{1+b+ab} + \frac{ab}{ab+1+b} \quad \text{--- 1m}$$

$$= 1.$$

--- 1m

37.

$$\log x = \log \left(\frac{0.5634 \times 0.0635}{2.563 \times 12.5} \right)$$

1m

$$= \log 0.5634 + \log 0.0635 - \log 2.563 - \log 12.5$$

$$= 7.7508 + 2.8028 - 0.4087 - 1.0969$$

$$= 3.048$$

1m.

$$38. a=65, T_n = a + (n-1)d$$

$$T_n=390, 390 = 65 + (n-1)13$$

$$d=13. \quad n=26$$

$$S_n = \frac{n}{2} (a+L) = 5915$$

} 1m

39.

$$A+B=36$$

$$B+C=34$$

$$C+A=40.$$

$$A+B+C=55$$

$$A=21 \text{ years}$$

$$B=15 \text{ years}$$

$$C=19 \text{ years}$$

} 2m

} 3m.

40.

$$mn = \sin^2 A \cdot \tan^2 A.$$

$$\sin A \tan A = \sqrt{mn}$$

$$m^2 - n^2 = (\tan A + \sin A)^2 - (\tan A - \sin A)^2$$

$$= 4 \tan A \sin A.$$

$$= 4 \sqrt{mn}$$

} 2m

} 3m.

41

$$\sin 300 = -\frac{\sqrt{3}}{2}, \sec 240 = -2$$

$$\cos 225 = -\frac{1}{\sqrt{2}}, \csc 240 = -\frac{2}{\sqrt{3}}.$$

$$\cot 315 = -1, \tan 300 = -\sqrt{3}$$

Substitution

1m.

$$\text{getting } x = \frac{2}{3}$$

1m.

VII

Answer the following (6+4)

42.

$$S = 7 + 77 + 777 + \dots$$

$$S = \frac{7}{9} [9 + 99 + 999 + \dots] \quad \text{1m}$$

$$S = \frac{7}{9} [(10-1) + (100-1) + (1000-1) + \dots] \quad \text{2m}$$

$$S = \frac{7}{9} [10 + 100 + 1000 + \dots - 1 - 1 - 1 - \dots] \quad \text{1m}$$

$$S = \frac{7}{9} \left[10 \frac{[10^n - 1]}{10 - 1} - n \right] \quad \text{2m}$$

(or)

$$AB = CD = \sqrt{10} \quad \text{2m}$$

$$BC = DA = \sqrt{8} \quad \text{2m}$$

$$AC = \sqrt{52}, \quad BD = 2 \quad \text{1m}$$

$$AC \neq BD$$

$$\text{Conclusion} \quad \text{1m}$$

$$43 \quad \log x [1 + 2 + 3 + \dots + n] \quad \text{2m}$$

$$= \log x \cdot \frac{n(n+1)}{2} \quad \text{2m}$$

(or)

$$\sin \theta = \frac{3}{5}, \quad \cos \theta = -\frac{4}{5} \quad \text{1m}$$

$$\text{Ans} = \frac{4 \times \frac{3}{5} - 7 \times -\frac{4}{5}}{3 \times \frac{3}{5} + 2 \times -\frac{4}{5}} = 40 \quad \text{3m}$$