

II PU Basic Mathematics (75)

Mid-Term Examination

Scheme of evaluation

PART-A

I Answer all the M.C.Q

(10 × 1 = 10)

1) (A) ± 2

2) (D) $\begin{bmatrix} -7 & 3 \\ -4 & 5 \end{bmatrix}$

3) (C) $\sim p \vee q$

4) (A) $3:7$

5) (B) 10.5

6) (C) $4-9-23$

7) (B) 1

8) (C) $\frac{1}{2}$

9) (D) $\frac{a}{b}$

10) (A) $e^{2/3}$

(8) $AB = \begin{bmatrix} 1 & 8 & 8 \\ 2 & 2 & 1 \\ 3 & 2 & 2 \end{bmatrix}$

II Match the following

(5x1=5)

11.

a)

v) -32

b)

iii) 119

c)

ii) 12

d)

(i) 1

e)

(vi) -3

III Fill in the blanks

12) 2

13) 3

14) 110

15) 4

16) 1

PART-B

IV Answer any six questions

6x2=12

17) $3+x-2=1$, $7+y-1=7$

2M

$x=0$

$y=1$

18) $AB = \begin{bmatrix} 2 & 8 & 4 \\ -1 & -4 & -2 \\ 3 & 12 & 6 \end{bmatrix}$

2M

$$\begin{aligned}
 19) & (\sim p \rightarrow q) \vee r \\
 & \Rightarrow (T \rightarrow T) \vee F \\
 & \Rightarrow T \vee F \\
 & \Rightarrow T
 \end{aligned}$$

$$\begin{aligned}
 20) & 1 = 3x + 4x + 5x = 6000 \\
 & x = 500
 \end{aligned}$$

$$\begin{aligned}
 3x &= 1500 \\
 4x &= 2000 \\
 5x &= 2500
 \end{aligned}$$

$$\begin{aligned}
 21) & \begin{array}{cc} \text{Person} & \text{Days} \\ 10 & 30 \\ 15 & x \end{array} \\
 & x = 20 \text{ days}
 \end{aligned}$$

$$22) \quad p = \frac{F}{1+tr} = \frac{2320}{1+(2 \times 0.08)}$$

$$p = ₹ 2000$$

$$\begin{aligned}
 23) \quad \cos\left(\frac{50}{2}\right) \cdot \sin\left(\frac{\theta}{2}\right) &= \frac{1}{2} \left[\sin\left(\frac{50}{2} + \frac{\theta}{2}\right) - \sin\left(\frac{50}{2} - \frac{\theta}{2}\right) \right] \\
 &= \frac{1}{2} [\sin 30 - \sin 20]
 \end{aligned}$$

$$24) \quad \lim_{x \rightarrow 0} \frac{x \left[\cos x + \frac{\sin x}{x} \right]}{x \left[1 + \frac{\tan x}{x} \right]}$$

$$\lim_{x \rightarrow 0} \frac{\cos x + \frac{\sin x}{x}}{1 + \frac{\tan x}{x}} = \frac{1+1}{1+1} = 1$$

$$25) \lim_{x \rightarrow -2} \frac{x^{-1} - (2)^{-1}}{x - (-2)}$$

$$(1M) = -\frac{1}{4}$$

PART-C

✓ Answer any

six questions

$$6 \times 3 = 18$$

$$26) A^2 = \begin{bmatrix} 17 & 8 \\ 16 & 9 \end{bmatrix} \quad (1M)$$

$$4A = \begin{bmatrix} 12 & 8 \\ 16 & 4 \end{bmatrix} \quad \& \quad 5I = \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix} \quad (1M)$$

$$A^2 - 4A - 5I = 0 \quad (1M)$$

$$27) \Delta = -24$$

$$\Delta x = -48$$

$$\Delta y = 24 \quad (2M)$$

$$x = 2, \quad y = -1 \quad (1M)$$

28) Converse: If $x \in A$ or $x \in B$ then $x \in (A \cup B)$ (1M)

Inverse: If $x \notin (A \cup B)$ then $x \notin A$ and $x \notin B$ (1M)

Contrapositive: If $x \notin A$ and $x \notin B$ then $x \notin (A \cup B)$ (1M)

$$29) SP = 100 + 40\% \text{ of } 100 \quad (1M)$$

$$SP = 140 \quad (1M)$$

$$\frac{SP}{CP} = \frac{140}{100} = \frac{7}{5} = 7:5 \quad (1M)$$

30) 1st tap can fill $\frac{1}{12}$ tank in 1 min

2nd tap can fill $\frac{1}{15}$ tank in 1 min

Drain pipe drain out $\frac{1}{20}^{\text{th}}$ tank in 1 min

$$\therefore \text{In 1 min} = \left(\frac{1}{12} + \frac{1}{15} - \frac{1}{20} \right)$$

$$= \frac{1}{10}^{\text{th}} \text{ of the tank is filled}$$

$\therefore$ the tank will get filled in 10 minutes

$$\begin{aligned} 31) \quad BD &= F - DV = 2920 - 2916 \\ BD &= Ftr = 4 \\ t &= 10 \text{ days} \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} (2M) \\ (1M) \end{array}$$

$$LOD = 20 - 4 - 97$$

$$\text{Date of drawing} = 17-10-96 \quad (1M)$$

$$32) \quad \sin A = \frac{3}{5} \quad \left(\frac{\pi}{2} < A < \pi \right) \quad \cos B = -\frac{8}{17} \quad \left(\frac{\pi}{2} < B < \pi \right)$$

$$\Rightarrow \cos A = -\frac{4}{5}$$

$$\sin B = \frac{15}{17} \quad (1M)$$

$$\sin(A+B) = \sin A \cos B + \cos A \sin B \quad (1M)$$

$$\sin(A+B) = \frac{-84}{85} \quad (1M)$$

$$33) \quad \text{proof of } \cos 3A \quad (2M)$$

34) If $f(x)$ is continuous at $x=1$ then $(1M)$

$$\lim_{x \rightarrow 1} (4x+3) = f(1) \quad (1M)$$

$$4(1)+3 = K+1$$

$$K = 6 \quad (1M)$$

PART-D

VI Answer any FOUR questions (4 × 5 = 20)

35) $A+B = \begin{bmatrix} 5 & 0 & -6 \\ 3 & -8 & 0 \\ 0 & 6 & 6 \end{bmatrix}$ (1M)

$(A+B)C = \begin{bmatrix} 26 & 23 & -14 \\ 12 & -21 & -2 \\ -6 & 0 & 30 \end{bmatrix}$ (1M)

$AC = \begin{bmatrix} 7 & 16 & -8 \\ 3 & -14 & 2 \\ -3 & 6 & 17 \end{bmatrix}$ (1M)

$BC = \begin{bmatrix} 19 & 7 & -6 \\ 9 & -7 & -4 \\ -3 & -6 & 13 \end{bmatrix}$ (1M)

Verification of $(A+B)C = AC + BC$ (1M)

36) $|A| = 2$ (1M)

$\text{Adj } A = \begin{bmatrix} -3 & 2 & -1 \\ 1 & 0 & -1 \\ -4 & 2 & -2 \end{bmatrix}$ (2M)

$X = A^{-1}B$

$x = 2, y = 1, z = 2$ (2M)

37) $(3+\sqrt{2})^4 + (3-\sqrt{2})^4$ (2M)

Expansion

$= 2[81 + 108 + 4]$ (2M)

$= 386$ (1M)

$$38) \frac{9x-27}{(x+1)(x-2)^2} = \frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{(x-2)^2} \quad (1M)$$

$$A = -4, B = 2, C = -3 \quad (3M)$$

Conclusion (1M)

39)

			(u)		(1)	(2)	(3)	
p	q	r	$\sim p$	$\sim q$	$(\sim p \wedge \sim q)$	$(q \wedge r)$	$(1) \wedge (2)$	$(3) \wedge (4)$
T	T	T	F	F	F	T	F	F
T	T	F	F	F	F	F	F	F
T	F	T	F	T	F	F	F	F
T	F	F	F	T	F	F	F	F
F	T	T	T	F	T	F	F	F
F	T	F	T	F	T	F	F	F
F	F	T	T	T	F	F	F	F
F	F	F	T	T	F	F	F	F
			$\underbrace{\hspace{1cm}}$		$\underbrace{\hspace{1cm}}$	$\underbrace{\hspace{1cm}}$	$\underbrace{\hspace{1cm}}$	$\underbrace{\hspace{1cm}}$
			1M		1M	1M	1M	1M

40)

Lots produced	Total o/p in units	Cumulative average time per unit (hrs)	Total hours	
1	1	1000	1000	
1	2	$(90\% \text{ of } 1000) = 900$	1800	
2	4	$(90\% \text{ of } 900) = 810$	3240	
4	8	$(90\% \text{ of } 810) = 729$	5832	
8	16	$(90\% \text{ of } 729) = 656.1$	10497.6	
16	32	$(90\% \text{ of } 656.1) = 590.49$	18895.68	(4M)

$$\text{Total hours} = 18895.68 \text{ hours}$$

$$\text{Total cost} = 18,895.68 \times 15$$

$$= ₹ 283435.20$$

(1M)

$$41) \text{ LHS: } \frac{(\sin 5A + \sin A) + (\sin 4A + \sin 2A)}{(\cos 5A + \cos A) + (\cos 4A + \cos 2A)} \quad (1M)$$

$$= \frac{2 \sin 3A \cos 2A + 2 \sin 3A \cos A}{2 \cos 3A \cos 2A + 2 \cos 3A \cos A} \quad (1M)$$

Taking common & simplify (3M)

$$= \tan 3A = \text{RHS}$$

PART - E

VII Answer the following questions

$$42) \text{ Case 1 : } (2M)$$

$$\text{Case 2 : } (2M)$$

$$\text{Case 3 : } (2M)$$

(or)

$$\lim_{x \rightarrow 3} \left[\frac{x^2 - 9}{\sqrt{3x+7} - \sqrt{5x+1}} \right]$$

Rationalize

Simplification

$$= -24$$

$$43) (0.99)^5 = (1 - 0.1)^5$$

$$= 1 - 0.05 + 0.001 - 0.00001 + 0.00000005 - 0.000000001$$

$$= 0.95099$$

(or)

$$(1.1)^5 = (1 + 0.1)^5$$

$$= 1 + 0.5 + 0.1 + 0.01 + 0.0005 + 0.00001$$

$$= 1.61051$$