

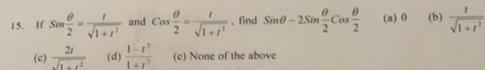
## DEPARTMENT OF MATHEMATICS FACULTY OF PHYSICAL SCIENCES UNIVERSITY OF BENIN, BENIN CITY

## FIRST SEMESTER EXAMINATIONS 2023/2024 SESSION

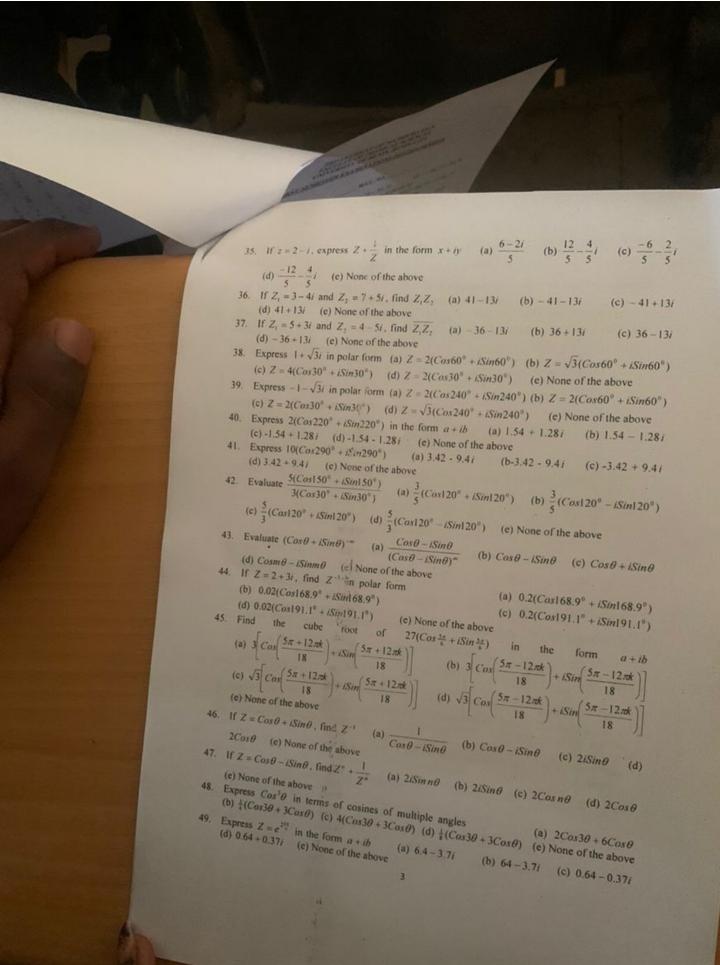
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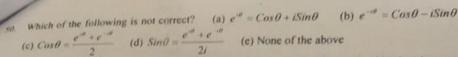
NAME

N	MAT. NO
1.	(a) $1 - \tan \theta = \sec \theta$ (b) $1 + \tan \theta = \sec \theta$
2	(c) $1 - Cot^2\theta = Sec^2\theta$ (d) $1 + Cot^2\theta = Sec^2\theta$ (e) None of the above
2.	(ii) i tuil 0 - Co sec 0 (D) I + tall 0 = Co sec 0
-	(c) $1 - Cot^2\theta = Co \sec^2 \theta$ (d) $1 + Cot^2\theta = Co \sec^2 \theta$ (e) None of the above
3.	$Tan(A+B)$ is equal to (a) $\frac{\tan A + \tan B}{1 - \tan A \tan B}$ (b) $\frac{\tan A + \tan B}{1 + \tan A \tan B}$ (c) $\frac{\tan A - \tan B}{1 - \tan A \tan B}$
	(d) $\frac{\tan A - \tan B}{1 + \tan A \tan B}$ (e) None of the above
4.	Evaluate $Sin2A - Cos2A$ (a) $-2Sin^2A + 2SinACosA + 1$ (b) $-2Cos^2A + 2SinACosA - 1$
	(c) $2Sin^2A + 2SinACosA - 1$ (d) $2SinACosA$ (e) None of the above
5.	Express $Sin3\theta$ only in terms of powers of $Sin\theta$ (a) $3Sin\theta - 4Sin^3\theta$ (b) $4Sin^3\theta - 3Sin\theta$
	(c) $4Cos^3\theta - 3Cos\theta$ (d) $3Cos\theta - 4Cos^3\theta$ (e) None of the above
6.	Express $Cos3\theta$ only in terms of powers of $Cos\theta$ . (a) $3Sin\theta - 4Sin^3\theta$ (b) $4Sin^3\theta - 3Sin\theta$
	(c) $4Cos^3\theta - 3Cos\theta$ (d) $3Cos\theta - 4Cos^3\theta$ (e) None of the above
7.	If $SinA = \frac{2t}{1+t^2}$ and $ConA = \frac{1-t^2}{1+t^2}$ , find $\tan A$ (a) $\frac{t}{1+t^2}$ (b) $\frac{t}{1-t^2}$ (c) $\frac{2t}{1+t^2}$ (d) $\frac{2t}{1-t^2}$
8.	(e) None of the above Evaluate $Sin(A+B) + Sin(A-B)$ (a) $SinACosB$ (b) $2SinACosB$ (c) $SinASinB$
٥.	(d) $2SinASinB$ (e) None of the above
).	If $Sin\theta = \frac{3}{5}$ , find $Sin2\theta$ (a) $\frac{24}{25}$ (b) $\frac{12}{25}$ (c) $\frac{6}{25}$ (d) $\frac{8}{25}$ (e) None of the above
0.	If $Sin\theta = \frac{3}{5}$ , find $Cos3\theta$ (a) $\frac{256}{125}$ (b) $\frac{12}{25}$ (c) $\frac{44}{125}$ (d) $\frac{-44}{125}$ (e) None of the above
1.	If $SinA = \frac{1}{5}$ and $SinB = \frac{12}{93}$ , find $Sin(A + B)$ (a) $\frac{33}{65}$ (b) $\frac{-15}{65}$ (c) $\frac{48}{65}$
	(d) $-48/65$ (e) None of the above
2.	Solve the equation $8Cosx + 15Sinx = \frac{17}{2}$ . (a) $x = 1^{\circ}56'$ or $121^{\circ}56'$ (b) $x = 10^{\circ}58'$ or $111^{\circ}58'$
	(c) $x = 15^{\circ}58'$ or $106^{\circ}58'$ . (d) $x = 15^{\circ}56'$ or $120^{\circ}56'$ (e) None of the above
,	
3.	
	(b) $4(Cos^3\theta - Sin^3\theta) + 3(Sin\theta - Cos\theta)$ (c) $-3(Sin\theta - Cos\theta) + 2(Cos^3\theta - Sin^3\theta)$
	(d) $24Cos^3\theta + 8Sin^3\theta - Cos\theta Sin\theta$ (e) None of the above
١.	If $Sin\theta = \frac{2t}{1+t^2}$ , evaluate $8Sin\theta Cos\theta - \tan\theta$ (a) $\frac{14t(1-2t^2+t^4)}{(1-t^2)(1+t^2)^2}$ (b) $\frac{2t(7-18t^2+7t^4)}{(1-t^2)(1+t^2)^2}$
1	(c) $\frac{7-18t^2-7t^4}{(1+t^2)^2}$ (d) $\frac{9t(2-2t^2+t^4)}{(1+t^2)^2}$ (e) None of the above



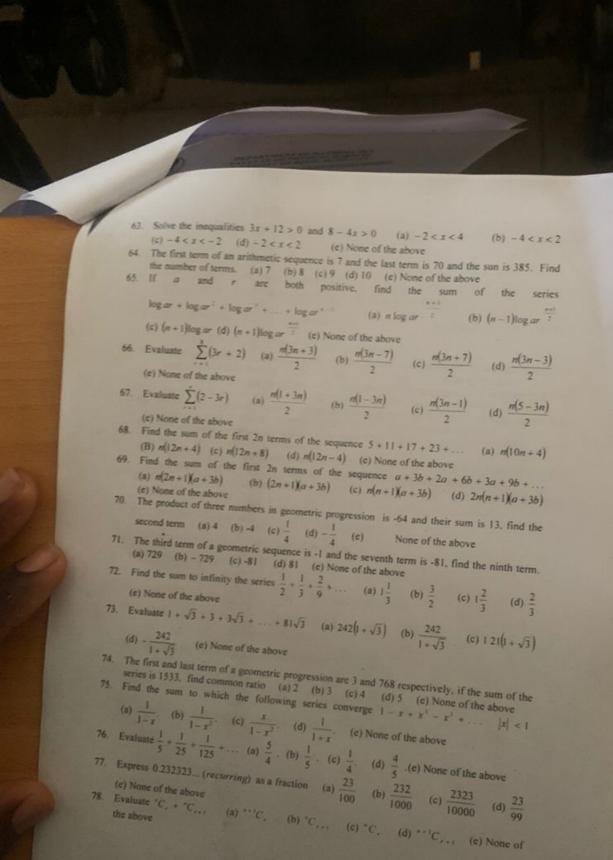
- 16. Which of the following is not correct? (a) Sin(A + B) = SinACosB + CosASinB(b) Cos(A + B) = CosACosB - SinASinB (c) Sin(A - B) = SinACosB - CosASinB(d) Cos(A - B) = CosACosB + SinASinB (e) None of the above
- 17. If  $\cos\theta = \frac{1}{7}$ , find  $2\sin\theta \tan\theta 5\cos\theta$  (a)  $-\frac{77}{35}$  (b)  $\frac{77}{35}$  (c)  $\frac{48}{35}$  (d)  $-\frac{125}{35}$  (e) None of the above
- 18. If  $Sec\theta = \frac{5}{4}$ , find  $5\frac{Sin\theta}{Cot\theta} 3Cosec\theta$  (a) 1 (b) -1 (c) 2 (d) -2 (e) None of the above
- 19. If  $Sec\theta = \frac{5}{4}$ , find  $1 + \tan^2 \theta$  (a)  $\frac{5}{4}$  (b)  $\frac{25}{4}$  (c)  $\frac{25}{16}$  (d)  $\frac{-25}{4}$  (e) None of the above
- 20. If  $Co\sec\theta = \frac{5}{3}$ , find  $1 + Cot^2\theta$  (a)  $\frac{9}{25}$  (b)  $-\frac{9}{25}$  (c)  $-\frac{25}{9}$  (d)  $\frac{29}{9}$  (e) None of the above
- 21. Evaluate  $i^4$  (a) -i (b) -1 (c) i (d) 1 (e) None of the above
- 22. Evaluate  $i^{37}$  (a) -i (b) -1 (c) i (d) 1 (e) None of the above
- 23. Evaluate  $(1-i)^2$  (a) i (b) 2i (c) -2i (d) -i (e) None of the above
- 24. Evaluate  $\frac{1-i}{i}$  (a) 1+i (b) 1-i (c) -1+i (d) -1-i (e) None of the above
- 25. Evaluate  $\frac{(1-i)^2}{1+i}$  (a) 1+i (b) 1-i (c) -1+i (d) -1-i (e) None of the above
- 26. Evaluate  $(1+i)^2$  (a) 2i (b) -2i (c) 1+2i (d) 1-2i (e) None of the above
- 27. If  $Z_1 = 1 + 3i$  and  $Z_2 = 7 + 2i$ , find  $Z_1 + Z_2$  (a) 8 + 5i (b) 6 + i (c) -8 5i (d) -6 i (e) None of the above
- 28. If  $Z_1 = 1 + 3i$  and  $Z_2 = 7 + 2i$ , find  $Z_1Z_2$  (a) 20 + 35i (b) 41 + 23i (c) 20 12i (d) 40 23i (e) None of the above
- 29. Evaluate  $\frac{5-3i}{2+9i}$  (a)  $\frac{17}{85} + \frac{51}{85}i$  (b)  $\frac{-17}{85} + \frac{51}{85}i$  (c)  $\frac{-17}{85} \frac{51}{85}i$  (d)  $\frac{17}{85} \frac{51}{85}i$  (e) None of the above
- 30. Evaluate  $\frac{2+3i}{4-5i}$  (a)  $\frac{22}{41} \frac{7}{41}i$  (b)  $\frac{7}{41} \frac{22}{41}i$  (c)  $\frac{7}{41} + \frac{22}{41}i$  (d)  $\frac{-7}{41} + \frac{22}{41}i$  (e) None of the above
- 31. Evaluate  $\frac{3-4i}{2-7i}$  (a)  $\frac{34}{53} + \frac{13}{53}i$  (b)  $\frac{34}{53} \frac{13}{53}i$  (c)  $\frac{-34}{53} \frac{13}{53}i$  (d)  $\frac{-34}{53} + \frac{13}{53}i$
- 32. Express  $\frac{(1+3i)^2}{2+i}$  in the form a+ib (a) 1+i (b) -1+2i (c) -2+4i (d) -2-4i (e) None of the above
- 33. Express  $(2-i)^4$  in the form a+ib (a) -7-24i (b) 7-24i (c) 7+24i (d) -7+24i (e) None of the above
- 34. If Z = 2 i, express  $Z^2 + 2Z + 3$  in the form x + iy (a) 5 3i (b) 5 + 3i (c) 10 6i (d) 10 + 6i (e) None of the above

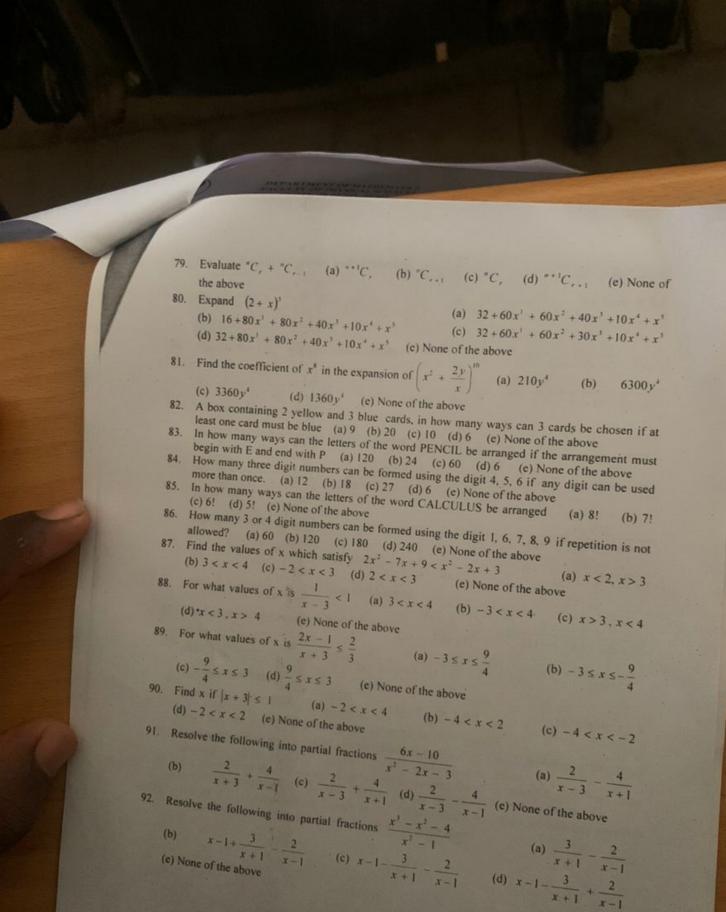


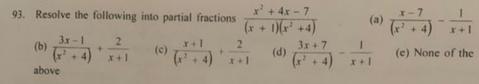


- 51. The set  $A = \{x/x \text{ is an integer}, 2 < x < 3\}$  (a) a singleton set (b) a set with two elements (c) an empty set (d) the universal set (e) None of the above
- 52. Find x if |x + 3| = 2 (a) 1, 5 (b) 1, -5 (c)-1, -5 (d) -1, 5 (e) None of the above
- 53. Find x if |x + 3| > 5 (a) x < 2, x > -8 (b) x > 2, x < -8 (c) -8 < x < 2 (d) x < 2, x < -8 (e) None of the above
- 54. Find y if  $\left| \frac{y-3}{y+1} \right| < 2$  (a)  $y > \frac{1}{3}$ , y < -5 (b)  $y < \frac{1}{3}$ , y > -5 (c)  $y > -\frac{1}{3}$ , y < -5(d)  $y > \frac{1}{3}$ , y < 5 (e) None of the above
- 55. Evaluate  $u_r$  for the following sequence 0, 7, 26, 63, 124, ... (a) 7(r-1) (b)  $r^2-1$ (c) 7r (d)  $r^3 - 1$  (e) None of the above
- 56. Evaluate the first 5 terms of the sequence whose  $u_i$  is given as follows  $\left(-\frac{1}{3}\right)^{-1}$ (a)  $-1, \frac{1}{3}, -\frac{1}{9}, \frac{1}{27}, -\frac{1}{81}$  (b)  $-1, -\frac{1}{3}, -\frac{1}{9}, -\frac{1}{27}, -\frac{1}{81}$  (c)  $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$ (d) 1,  $-\frac{1}{3}$ ,  $\frac{1}{9}$ ,  $-\frac{1}{27}$ ,  $\frac{1}{81}$  (e) None of the above
- 57. The sum of the first n terms of a series is given as  $S_n = n^3 2n$  for all values of n, find the formula for the rth term (a)  $3r^2 + 3r + 1$  (b)  $3r^2 + 3r - 1$  (c)  $3r^2 - 3r + 1$ (d)  $3r^2 - 3r - 1$  (e) None of the above
- Find the three arithmetic means between -5 and 59. (a) 27 (b) 32 (c) 11, 27, 43
- The second term of a geometric sequence is 24 and the fifth term is 81, find the seventh term. (a)  $\frac{729}{4}$  (b) 81 (c) 729 (d)  $\frac{81}{4}$  (e) None of the above 60. Evaluate  $\sum_{r=1}^{n} (2-3r)$  (a)  $\frac{n(1+3n)}{2}$  (b)  $\frac{n(3n-1)}{2}$  (c)  $\frac{n(1-3n)}{2}$  (d)  $-\frac{n(1-3n)}{2}$
- The third term of an arithmetic progression is 18 and the seventh term is 30, find the sum of the first thirty three terms (a) 1890 (b) 720 (c) 1980 (d) 1800 (e) None of the
- The third term of a geometric sequence is -1 and the seventh term is -81. find the ninth term.

  (a) -729 (b) 729 (c) -81 (d) 81 (e) None of the above Express
  - $\frac{23-11x}{(x+1)(x-2)(x-3)} \text{ into pairtial fraction}$ (b)  $\frac{3}{x+1} \frac{1}{x-2} \frac{2}{x-3}$ (c)  $\frac{3}{x+1} \frac{1}{x-2} + \frac{2}{x-3}$ (d)  $\frac{3}{x+1} + \frac{1}{x-2} \frac{2}{x-3}$ (e) None of







94. Resolve the following into partial fractions 
$$\frac{x^2}{(x+1)^3}$$
 (a)  $\frac{1}{x+1} - \frac{2}{(x+1)^2} + \frac{1}{(x+1)^2}$  (b)  $\frac{1}{x+1} + \frac{1}{(x+1)^2} + \frac{1}{(x+1)^3}$  (c)  $\frac{1}{x+1} - \frac{2}{(x+1)^2} - \frac{1}{(x+1)^3}$  (d)  $\frac{1}{x+1} + \frac{2}{(x+1)^2} - \frac{1}{(x+1)^3}$ 

95. Resolve the following into partial fractions 
$$\frac{4x+11}{(x^2+4x-5)}$$
 (a)  $\frac{1}{2}(\frac{3}{x+5}-\frac{5}{x-1})$  (b)  $\frac{1}{2}(\frac{3}{x-5}+\frac{5}{x+1})$  (c)  $\frac{1}{2}(\frac{3}{x-5}+\frac{5}{x-1})$  (d)  $\frac{1}{2}(\frac{3}{x+5}+\frac{5}{x-1})$  (e) None of the above

96. Resolve the following into partial fractions

(a) 
$$\frac{1}{2x+1} \frac{1}{x^2+2x+3}$$
 (b)  $\frac{1}{2x+1} \frac{1}{x^2+2x+3}$  (c)  $\frac{1}{2x+1} \frac{3}{x^2+2x+3}$  (d)  $\frac{1}{2x+1} \frac{4}{x^2+2x+3}$  (e) None of the above

97. Resolve the following into partial fractions. 
$$\frac{7x+2}{(2x-3)(x+1)^2}$$
(a)  $\frac{2}{2x-3} - \frac{1}{x+1} - \frac{1}{(x+1)^2}$ 
(b)  $\frac{2}{2x-3} + \frac{1}{x+1} + \frac{1}{(x+1)^2}$ 
(c)  $\frac{2}{2x-3} + \frac{1}{x+1} - \frac{1}{(x+1)^2}$ 
(d)  $\frac{2}{2x-3} - \frac{1}{x+1} + \frac{1}{(x+1)^2}$ 
Determine n and r if "P<sub>r</sub> =  $\frac{10!}{4!}$ 
(a)  $n = 10, r = 4$ 
(b)  $n = 10, r = 6$ 

98. How many  $A = 0$  (c) None set

- (c) n = 6, r = 4 (d) n = 10, r = 10 (e) None of the above
- How many 4 digit even numbers can be formed using the digit 1, 6, 7, 8, 9 if repetition is not allowed? (a) 80 (b) 120 (c) 60 (d) 48 (e) None of the above A committee of three boys and 4 girls is to be formed from5 boys and 6 girls, how many
- committees are possible? (a) 420 (b) 60 (c) 25 (d) 360 (e) None of the above 100. The set  $A = \{x \mid x \text{ is an integer}, 2 < x < 3\}$  is (a) a singleton set (b) a set with two elements

- 101. If a set A has n elements, then A has (a)  $2^n$  subsets (b)  $2^{(n-1)}$  subsets (c)  $2^{(n-1)}$  subsets (d) 2n subsets (e) None of the above
- 102. If the set  $A = \{a, b, c\}$ , then the power set of A has (a) three elements (b) eight elements (c) seven elements (d) six elements (e) None of the above
- 103. Which of the following is false (a) 0 is an integer (b) 0 is a natural number (c) 0 is a real number (d) 0 is a rational number (e) None of the above
- 17,26} (b) {5, 10, 17, 26} (c) {2, 5, 10, 17} (d) {5, 10, 17} (e) None of the above
- 105. Let the universal set  $u = \{x \mid 1 \le x \le 20, x \text{ is an integer}\}$   $P = \{x 1 \mid 10 \le x \le 18, x \text{ is even}\}$  $Q = \{x \mid 2 < x \le 15, x \text{ is odd}\}$  Find  $P \cap Q'$  (a)  $\{17\}$  (b)  $\{12, 17\}$  (c)  $\{17, 18\}$  (d)  $\phi$ (e) None of the above
- 106. Let  $P = \{x - 1 \mid 10 \le x \le 18, x \text{ is even}\}.$  $Q = \{x \mid 2 < x \le 15, \quad x \text{ is odd}\}$  $R = \{x \mid 1 < x \le 20, x \text{ is a multiple of 3}\}$ . Find  $P \cap (Q \cap R)$  (a)  $\{3, 9, 15\}$  (b)  $\{9, 15\}$ (c) \$\phi\$ (d) {3, 6, 9, 15} (e) None of the above
- 107. Find B A for the following pairs of sets  $A = \{3,1\}$  and  $B = \{4,1,6,3\}$  (a)  $\{3,1\}$  (b)  $\{4,6\}$
- 108. If  $A = \{1, 2, 3, 4\}$  and  $B = \{2, 4\}$  then  $A \cup B = \{3, 4\}$ (c) {1, 2, 3, 4} (d) \$\phi\$ (e) None of the above (a) {2, 4} (b) {1, 2, 2, 3, 4, 4}
- 109. Given that  $U = \{a, b, c, d, e, f, g\}$ ,  $P = \{a, b, d, f\}$  and  $Q = \{a, c, d, g\}$ . Find  $P \cup Q'$ (a)  $\{b,e,f\}$  (b)  $\{a,b,d,e\}$  (c)  $\{a,b,d,f\}$  (c)  $\{a,b,d,e,f\}$  (e) None of the above
- 110. Given that  $P = \{a, b, d, f\}$ .  $Q = \{a, c, d\}$  and  $R = \{f, c, a, d\}$ . Find  $P \cup Q \cup R$  (a)  $\{a, b, c, d, f\}$  (b)  $\{a, a, b, c, d\}$  (c)  $\{a, b, c, c, f\}$  (d)  $\{a, b, c, d, d\}$  (e) None of the above
- 111. If  $A = \{1,2,3,6,8\}$  and  $C = \{4,5,6,8\}$ , find  $A\Delta C$  $\{1,2,3,4,5,8\}$  (d)  $\phi$  (e) None of the above (a) {1,2,3,4,5,6} (b) {1,2,3,4,5}
- 112. If  $A = \{1,2,3,6,8\}$ ,  $B = \{2,5,6,7,9\}$  and  $C = \{4,5,6,8\}$ , find  $(A\Delta B)\Delta C$  (a)  $\{1,3,7,9\}$  (b)  $\{4,6\}$ (e) {1,3,4,6,7,9} (d) {1,3,7,8,9,5} (e) None of the above
- 113. If  $A = \{1,2,3,6,8\}$ ,  $B = \{2,5,6,7,9\}$  and  $C = \{4,5,6,8\}$ , find  $A \cap (B\Delta C)$  (a)  $\{2,7,9\}$  (b)  $\{4,7,8\}$
- 114. If  $A = \{1,2,3,6,8\}$ ,  $B = \{2,5,6,7,9\}$  and  $C = \{4,5,6,8\}$ , find  $C \cup (A \triangle B)$  (a)  $\{1,3,4,5,6,7,8,9\}$ (b) {1,2,3,6,8,9} (c) {1,4,5,6,7,8,9} (d) {3,4,5,6,7,8,9} (e) None of the above
- 115. If A and B are any two sets then  $(A \cap B)' =$ (d)  $A' \cap B$  (e) None of the above (a)  $A' \cap B'$  (b)  $A' \cup B'$  (c)  $A \cup B'$ 116. If A and B are any two sets then  $(A \cup B)' =$
- (d)  $A' \cap B$  (e) None of the above (a) A U B' (b) A' ∪ B' (c) A'∩B'
- 117. If  $\psi$  is the universal set and A is any set then  $A\Delta\psi =$
- 118. For two sets A and B,  $n(A \cup B) = (a) n(A) + n(B) n(A \cap B)$  (b)  $n(A) + n(B) n(A \cup B)$ (c)  $n(A) + n(B) + n(A \cap B)$  (d)  $n(A) + n(B) + n(A \cup B)$  (e) None of the above
- 119. In a certain gathering of 200 students, 60% of them like Economics while 77% of them like History. How many students like both History and Economics? (a) 37 (b) 74 (c) 40 (d)
- 120. In a class of 125 students 4 belong to Music and Press clubs only, 5 belong to Press and Drama clubs only while 20 are members of Music and Drama clubs. The Press club has