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

FIRST SEMESTER EXAMINATIONS 2023/2024 SESSION

MTH1[illegible]

NAME_____ **MAT. NO.**_____

1. Which of the following is correct? (a) $1-\tan^2\theta = Sec^2\theta$ (b) $1+\tan^2\theta = Sec^2\theta$ (c) $1-Cot^2\theta = Sec^2\theta$ (d) $1+Cot^2\theta = Sec^2\theta$ (e) None of the above
2. Which of the following is correct? (a) $1-\tan^2\theta = Cosec^2\theta$ (b) $1+\tan^2\theta = Cosec^2\theta$ (c) $1-Cot^2\theta = Cosec^2\theta$ (d) $1+Cot^2\theta = Cosec^2\theta$ (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 $CosA=\frac{1-t^2}{1+t^2}$, find $\tan A$ (a) $\frac{t}{1+t^2}$ (b) $\frac{t}{1-t^2}$ (c) $\frac{2t}{1+t^2}$ (d) $\frac{2t}{1-t^2}$ (e) None of the above
8. Evaluate $Sin(A+B)+Sin(A-B)$ (a) $SinACosB$ (b) $2SinACosB$ (c) $SinASinB$ (d) $2SinASinB$ (e) None of the above
9. If $Sin\theta=\frac{3}{5}$, find $Sin2\theta$ (a) $24/25$ (b) $12/25$ (c) $6/25$ (d) $8/25$ (e) None of the above
10. If $Sin\theta=\frac{3}{5}$, find $Cos3\theta$ (a) $256/125$ (b) $12/25$ (c) $44/125$ (d) $-44/125$ (e) None of the above
11. If $SinA=\frac{3}{5}$ and $SinB=\frac{12}{13}$, find $Sin(A+B)$ (a) $33/65$ (b) $-15/65$ (c) $48/65$ (d) $-48/65$ (e) None of the above
12. Solve the equation $8Cosx+15Sinx=17/2$. (a) $x=1^0 56'$ *or* $121^0 56'$ (b) $x=10^0 58'$ *or* $111^0 58'$ (c) $x=15^0 58'$ *or* $106^0 58'$ (d) $x=15^0 56'$ *or* $120^0 56'$ (e) None of the above
13. Evaluate $Sin3\theta+Cos3\theta$ (a) $-4(Cos^3\theta-Sin^3\theta)+3(Sin\theta+Cos\theta)$ (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
14. 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) $\frac{2t(7-18t^2+7t^4)}{(1-t^2)(1+t^2)^2}$ (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

15. If $Sin\frac{\theta}{2}=\frac{t}{\sqrt{1+t^2}}$ and $Cos\frac{\theta}{2}=\frac{t}{\sqrt{1+t^2}}$, find $Sin\theta-2Sin\frac{\theta}{2}Cos\frac{\theta}{2}$ (a) 0 (b) $\frac{t}{\sqrt{1+t^2}}$ (c) $\frac{2t}{\sqrt{1+t^2}}$ (d) $\frac{1-t^2}{1+t^2}$ (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 $Cos\theta=\frac{3}{5}$, find $2Sin\theta\tan\theta-5Cos\theta$ (a) $-77/35$ (b) $77/35$ (c) $48/35$ (d) $-125/35$ (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) $5/4$ (b) $25/4$ (c) $25/16$ (d) $-25/4$ (e) None of the above

20. If $Cosec\theta=\frac{5}{3}$, find $1+Cot^2\theta$ (a) $9/25$ (b) $-9/25$ (c) $-25/9$ (d) $29/9$ (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) $\frac{-34}{53}+\frac{13}{53}i$ (e) None of the above

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

35. If $z = 2 - i$, express $Z + \frac{1}{Z}$ in the form $x + iy$ (a) $\frac{6-2i}{5}$ (b) $\frac{12}{5} - \frac{4}{5}i$ (c) $\frac{-6}{5} - \frac{2}{5}i$
(d) $\frac{-12}{5} - \frac{4}{5}i$ (e) None of the above

36. If $Z_1 = 3 - 4i$ and $Z_2 = 7 + 5i$, find $Z_1 Z_2$ (a) $41 - 13i$ (b) $-41 - 13i$ (c) $-41 + 13i$
(d) $41 + 13i$ (e) None of the above

37. If $Z_1 = 5 + 3i$ and $Z_2 = 4 - 5i$, find $\overline{Z_1 Z_2}$ (a) $-36 - 13i$ (b) $36 + 13i$ (c) $36 - 13i$
(d) $-36 + 13i$ (e) None of the above

38. Express $1 + \sqrt{3}i$ in polar form (a) $Z = 2(Cos60^\circ + iSin60^\circ)$ (b) $Z = \sqrt{3}(Cos60^\circ + iSin60^\circ)$
(c) $Z = 4(Cos30^\circ + iSin30^\circ)$ (d) $Z = 2(Cos30^\circ + iSin30^\circ)$ (e) None of the above

39. Express $-1 - \sqrt{3}i$ in polar form (a) $Z = 2(Cos240^\circ + iSin240^\circ)$ (b) $Z = 2(Cos60^\circ + iSin60^\circ)$
(c) $Z = 2(Cos30^\circ + iSin30^\circ)$ (d) $Z = \sqrt{3}(Cos240^\circ + iSin240^\circ)$ (e) None of the above

40. Express $2(Cos220^\circ + iSin220^\circ)$ in the form $a + ib$ (a) $1.54 + 1.28i$ (b) $1.54 - 1.28i$
(c) $-1.54 + 1.28i$ (d) $-1.54 - 1.28i$ (e) None of the above

41. Express $10(Cos290^\circ + iSin290^\circ)$ (a) $3.42 - 9.4i$ (b-3.42 - 9.4i (c) -3.42 + 9.4i
(d) $3.42 + 9.4i$ (e) None of the above

42. Evaluate $\frac{5(Cos150^\circ + iSin150^\circ)}{3(Cos30^\circ + iSin30^\circ)}$ (a) $\frac{3}{5}(Cos120^\circ + iSin120^\circ)$ (b) $\frac{3}{5}(Cos120^\circ - iSin120^\circ)$
(c) $\frac{5}{3}(Cos120^\circ + iSin120^\circ)$ (d) $\frac{5}{3}(Cos120^\circ - iSin120^\circ)$ (e) None of the above

43. Evaluate $(Cos\theta + iSin\theta)^{-m}$ (a) $\frac{Cos\theta - iSin\theta}{(Cos\theta - iSin\theta)^m}$ (b) $Cos\theta - iSin\theta$ (c) $Cos\theta + iSin\theta$
(d) $Cosm\theta - iSinm\theta$ (e) None of the above

44. If $Z = 2 + 3i$, find Z^{-3} in polar form
(a) $0.2(Cos168.9^\circ + iSin168.9^\circ)$
(b) $0.02(Cos168.9^\circ + iSin168.9^\circ)$
(c) $0.2(Cos191.1^\circ + iSin191.1^\circ)$
(d) $0.02(Cos191.1^\circ + iSin191.1^\circ)$
(e) None of the above

45. Find the cube root of $27(Cos\frac{2\pi}{6} + iSin\frac{2\pi}{6})$ in the form $a + ib$
(a) $3\left[Cos\left(\frac{5\pi + 12\pi k}{18}\right) + iSin\left(\frac{5\pi + 12\pi k}{18}\right)\right]$
(b) $3\left[Cos\left(\frac{5\pi - 12\pi k}{18}\right) + iSin\left(\frac{5\pi - 12\pi k}{18}\right)\right]$
(c) $\sqrt{3}\left[Cos\left(\frac{5\pi + 12\pi k}{18}\right) + iSin\left(\frac{5\pi + 12\pi k}{18}\right)\right]$
(d) $\sqrt{3}\left[Cos\left(\frac{5\pi - 12\pi k}{18}\right) + iSin\left(\frac{5\pi - 12\pi k}{18}\right)\right]$
(e) None of the above

46. If $Z = Cos\theta + iSin\theta$, find Z^{-1} (a) $\frac{1}{Cos\theta - iSin\theta}$ (b) $Cos\theta - iSin\theta$ (c) $2iSin\theta$ (d) $2Cos\theta$ (e) None of the above

47. If $Z = Cos\theta - iSin\theta$, find $Z^n + \frac{1}{Z^n}$ (a) $2iSinn\theta$ (b) $2iSin\theta$ (c) $2Cos\,n\theta$ (d) $2Cos\theta$
(e) None of the above

48. Express $Cos^3\theta$ in terms of cosines of multiple angles (a) $2Cos3\theta + 6Cos\theta$
(b) $\frac{1}{4}(Cos3\theta + 3Cos\theta)$ (c) $4(Cos3\theta + 3Cos\theta)$ (d) $\frac{1}{8}(Cos3\theta + 3Cos\theta)$ (e) None of the above

49. Express $Z = e^{\frac{2\pi i}{6}}$ in the form $a + ib$ (a) $6.4 - 3.7i$ (b) $64 - 3.7i$ (c) $0.64 - 0.37i$
(d) $0.64 + 0.37i$ (e) None of the above

50. Which of the following is not correct? (a) $e^{i\theta} = Cos\theta + iSin\theta$ (b) $e^{-i\theta} = Cos\theta - iSin\theta$ (c) $Cos\theta = \frac{e^{i\theta} + e^{-i\theta}}{2}$ (d) $Sin\theta = \frac{e^{i\theta} + e^{-i\theta}}{2i}$ (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_r is given as follows $\left(-\frac{1}{3}\right)^{r-1}$

(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

58. Find the three arithmetic means between -5 and 59. (a) 27 (b) 32 (c) 11, 27, 43 (d) 27, 32, 37 (e) None of the above

59. 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) $-\frac{n(1-3n)}{2}$ (e) None of the above

61. 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 above

62. 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

$\frac{25-11x}{(x+1)(x-2)(x-3)}$ into partial fraction Express

(a) $\frac{2}{x+1} - \frac{3}{x-2} + \frac{1}{x-3}$ (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 the above.

63. Solve the inequalities $3x + 12 > 0$ and $8 - 4x > 0$ (a) $-2 < x < 4$ (b) $-4 < x < 2$ (c) $-4 < x < -2$ (d) $-2 < x < 2$ (e) None of the above

64. The first term of an arithmetic sequence is 7 and the last term is 70 and the sun is 385. Find the number of terms. (a) 7 (b) 8 (c) 9 (d) 10 (e) None of the above

65. If a and r are both positive, find the sum of the series $\log ar + \log ar^2 + \log ar^3 + \ldots + \log ar^{n-1}$ (a) $n \log ar^{\frac{n+1}{2}}$ (b) $(n-1)\log ar^{\frac{n+1}{2}}$ (c) $(n+1)\log ar$ (d) $(n+1)\log ar^{\frac{n+1}{2}}$ (e) None of the above

66. Evaluate $\sum_{r=1}^{n}(3r + 2)$ (a) $\frac{n(3n+3)}{2}$ (b) $\frac{n(3n-7)}{2}$ (c) $\frac{n(3n+7)}{2}$ (d) $\frac{n(3n-3)}{2}$ (e) None of the above

67. Evaluate $\sum_{r=1}^{n}(2 - 3r)$ (a) $\frac{n(1+3n)}{2}$ (b) $\frac{n(1-3n)}{2}$ (c) $\frac{n(3n-1)}{2}$ (d) $\frac{n(5-3n)}{2}$ (e) None of the above

68. Find the sum of the first 2n terms of the sequence $5 + 11 + 17 + 23 + \ldots$ (a) $n(10n+4)$ (B) $n(12n+4)$ (c) $n(12n+8)$ (d) $n(12n-4)$ (e) None of the above

69. Find the sum of the first 2n terms of the sequence $a + 3b + 2a + 6b + 3a + 9b + \ldots$ (a) $n(2n+1)(a+3b)$ (b) $(2n+1)(a+3b)$ (c) $n(n+1)(a+3b)$ (d) $2n(n+1)(a+3b)$ (e) None of the above

70. The product of three numbers in geometric progression is -64 and their sum is 13. find the second term (a) 4 (b) -4 (c) $\frac{1}{4}$ (d) $-\frac{1}{4}$ (e) None of the above

71. 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

72. Find the sum to infinity the series $\frac{1}{2} + \frac{1}{3} + \frac{2}{9} + \ldots$ (a) $1\frac{1}{3}$ (b) $\frac{3}{2}$ (c) $1\frac{2}{3}$ (d) $\frac{2}{3}$ (e) None of the above

73. Evaluate $1 + \sqrt{3} + 3 + 3\sqrt{3} + \ldots + 81\sqrt{3}$ (a) $242(1+\sqrt{3})$ (b) $\frac{242}{1+\sqrt{3}}$ (c) $121(1+\sqrt{3})$ (d) $-\frac{242}{1+\sqrt{3}}$ (e) None of the above

74. The first and last term of a geometric progression are 3 and 768 respectively, if the sum of the series is 1533, find common ratio (a) 2 (b) 3 (c) 4 (d) 5 (e) None of the above

75. Find the sum to which the following series converge $1 - x + x^2 - x^3 + \ldots \quad |x| < 1$
(a) $\frac{1}{1-x}$. (b) $\frac{1}{1-x^2}$. (c) $\frac{x}{1-x^2}$. (d) $\frac{1}{1+x}$. (e) None of the above

76. Evaluate $\frac{1}{5} + \frac{1}{25} + \frac{1}{125} + \ldots$ (a) $\frac{5}{4}$. (b) $\frac{1}{5}$. (c) $\frac{1}{4}$. (d) $\frac{4}{5}$.(e) None of the above

77. Express 0.232323... (*recurring*) as a fraction (a) $\frac{23}{100}$ (b) $\frac{232}{1000}$ (c) $\frac{2323}{10000}$ (d) $\frac{23}{99}$ (e) None of the above

78. Evaluate ${}^{n}C_{r} + {}^{n}C_{r+1}$ (a) ${}^{n+1}C_{r}$ (b) ${}^{n}C_{r+1}$ (c) ${}^{n}C_{r}$ (d) ${}^{n+1}C_{r+1}$ (e) None of the above

79. Evaluate ${}^{n}C_{r} + {}^{n}C_{r-1}$ (a) ${}^{n+1}C_{r}$ (b) ${}^{n}C_{r+1}$ (c) ${}^{n}C_{r}$ (d) ${}^{n+1}C_{r+1}$ (e) None of the above

80. Expand $(2+x)^5$

(a) $32+60x^1+60x^2+40x^3+10x^4+x^5$
(b) $16+80x^1+80x^2+40x^3+10x^4+x^5$
(c) $32+60x^1+60x^2+30x^3+10x^4+x^5$
(d) $32+80x^1+80x^2+40x^3+10x^4+x^5$
(e) None of the above

81. Find the coefficient of x^8 in the expansion of $\left(x^2+\frac{2y}{x}\right)^{10}$ (a) $210y^4$ (b) $6300y^4$ (c) $3360y^4$ (d) $1360y^4$ (e) None of the above

82. A box containing 2 yellow and 3 blue cards, in how many ways can 3 cards be chosen if at least one card must be blue (a) 9 (b) 20 (c) 10 (d) 6 (e) None of the above

83. In how many ways can the letters of the word PENCIL be arranged if the arrangement must begin with E and end with P (a) 120 (b) 24 (c) 60 (d) 6 (e) None of the above

84. How many three digit numbers can be formed using the digit 4, 5, 6 if any digit can be used more than once. (a) 12 (b) 18 (c) 27 (d) 6 (e) None of the above

85. In how many ways can the letters of the word CALCULUS be arranged (a) 8! (b) 7! (c) 6! (d) 5! (e) None of the above

86. How many 3 or 4 digit numbers can be formed using the digit 1, 6, 7, 8, 9 if repetition is not allowed? (a) 60 (b) 120 (c) 180 (d) 240 (e) None of the above

87. Find the values of x which satisfy $2x^2-7x+9<x^2-2x+3$ (a) $x<2,\ x>3$ (b) $3<x<4$ (c) $-2<x<3$ (d) $2<x<3$ (e) None of the above

88. For what values of x is $\frac{1}{x-3}<1$ (a) $3<x<4$ (b) $-3<x<4$ (c) $x>3,\ x<4$ (d) $x<3,\ x>4$ (e) None of the above

89. For what values of x is $\frac{2x-1}{x+3}\le\frac{2}{3}$ (a) $-3\le x\le\frac{9}{4}$ (b) $-3\le x\le-\frac{9}{4}$ (c) $-\frac{9}{4}\le x\le 3$ (d) $\frac{9}{4}\le x\le 3$ (e) None of the above

90. Find x if $|x+3|\le 1$ (a) $-2<x<4$ (b) $-4<x<2$ (c) $-4<x<-2$ (d) $-2<x<2$ (e) None of the above

91. Resolve the following into partial fractions $\frac{6x-10}{x^2-2x-3}$

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

92. Resolve the following into partial fractions $\frac{x^3-x^2-4}{x^2-1}$

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

93. Resolve the following into partial fractions $\frac{x^2+4x-7}{(x+1)(x^2+4)}$ (a) $\frac{x-7}{(x^2+4)}-\frac{1}{x+1}$ (b) $\frac{3x-1}{(x^2+4)}+\frac{2}{x+1}$ (c) $\frac{x+1}{(x^2+4)}+\frac{2}{x+1}$ (d) $\frac{3x+7}{(x^2+4)}-\frac{1}{x+1}$ (e) None of the above

94. Resolve the following into partial fractions $\frac{x^2}{(x+1)^3}$ (a) $\frac{1}{x+1}-\frac{2}{(x+1)^2}+\frac{1}{(x+1)^3}$ (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) $\frac{1}{x+1}+\frac{2}{(x+1)^2}-\frac{1}{(x+1)^3}$ (e) None of the above

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

96. Resolve the following into partial fractions $\frac{x^2+2}{(2x+1)(x^2+2x+3)}$ (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) $\frac{2}{2x-3}-\frac{1}{x+1}+\frac{1}{(x+1)^2}$ (e) None of the above

Determine n and r if ${}^nP_r = \frac{10!}{4!}$ (a) $n=10,\ r=4$ (b) $n=10,\ r=6$ (c) $n=6,\ r=4$ (d) $n=10,\ r=10$ (e) None of the above

98. 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

99. 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 (c) an empty set (d) the universal set (e) None of the above

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

104. List the elements of the following set $\{x^2+1 \mid x \text{ is an integer and } 1 < x < 5\}$ (a) {2, 5, 10, 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 $u = \{x \mid 1 \le x \le 20, x \text{ is an integer}\}$ $P = \{x-1 \mid 10 \le x \le 18, \quad x \text{ is even}\}$ $Q = \{x \mid 2 < x \le 15, \quad x \text{ is odd}\}$. Find $P \cap Q'$ (a) {17} (b) {12, 17} (c) {17, 18} (d) ϕ (e) None of the above

106. Let $P = \{x-1 \mid 10 \le x \le 18, \quad x \text{ is even}\}$, $Q = \{x \mid 2 < x \le 15, \quad x \text{ is odd}\}$ and $R = \{x \mid 1 < x \le 20, \quad x \text{ is a multiple of } 3\}$. Find $P \cap (Q \cap R)$ (a) {3, 9, 15} (b) {9, 15} (c) ϕ (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} (c) {4, 1} (d) {4, 3} (e) None of the above

108. If $A = \{1, 2, 3, 4\}$ and $B = \{2, 4\}$ then $A \cup B =$ (a) {2, 4} (b) {1, 2, 2, 3, 4, 4} (c) {1, 2, 3, 4} (d) ϕ (e) None of the above

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 $A \Delta C$ (a) $\{1,2,3,4,5,6\}$ (b) $\{1,2,3,4,5\}$ (c) $\{1,2,3,4,5,8\}$ (d) ϕ (e) None of the above

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) $\{4,6\}$ (c) $\{1,3,4,6,7,9\}$ (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) $\{4,7,8\}$ (c) $\{7,9\}$ (d) $\{2,8\}$ (e) None of the above

114. If $A = \{1,2,3,6,8\}$, $B = \{2,5,6,7,9\}$ and $C = \{4,5,6,8\}$, find $C \cup (A \Delta B)$ (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 $(A \cap B)' =$ (a) $A' \cap B'$ (b) $A' \cup B'$ (c) $A \cup B'$ (d) $A' \cap B$ (e) None of the above

116. If A and B are any two sets then $(A \cup B)' =$ (a) $A \cup B'$ (b) $A' \cup B'$ (c) $A' \cap B'$ (d) $A' \cap B$ (e) None of the above

117. If $\cup$ is the universal set and A is any set then $A \Delta \cup =$ (a) A (b) ϕ (c) $\cup$ (d) A' (e) None of the above

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) 23 (e) None of the above

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