Assignment 3

AI24BTECH11031 - Shivram S

31) ABC is a triangle, right angled at **A**. The resultant of the forces acting along AB. BC with magnitudes $\frac{1}{AB}$ and $\frac{1}{AC}$ respectively is the force along AD where **D** is the foot of the perpendicular from **A** onto BC. The magnitude of the resultant is (2006)

   a) $\frac{AB^2+AC^2}{(AB)^2(AC)^2}$

   b) $\frac{(AB)(AC)}{AB+AC}$

   c) $\frac{1}{AB} + \frac{1}{AC}$

   d) $\frac{1}{AD}$

32) Let W denote the words in the English dictionary. Define the relation R by $R = \{(x, y) \in W \times W|$ the words x and y have at least one letter in common.$\}$ then R is (2006)

   a) not reflexive, symmetric, transitive

   b) reflexive, symmetric and not transitive

   c) reflexive, symmetric and transitive

   d) reflexive, not symmetric and transitive

33) Suppose a population A has 100 observations 101, 102, $\ldots$, 200 and another population B has 100 observations 151, 152, $\ldots$, 250. If V_A and V_B represent the variances of the two populations, respectively then $\frac{V_A}{V_B}$ is (2006)

   a) 1

   b) $\frac{9}{4}$

   c) $\frac{4}{9}$

   d) $\frac{2}{3}$

34) A particle has two velocities of equal magnitude inclined to each other at an angle θ. If one of them is halved, the angle between the other and the original resultant velocity is bisected by the new resultant. Then θ is (2006)

   a) 90°

   b) 120°

   c) 45°

   d) 60°

35) A body falling from rest under gravity passes a certain point **P**. It was at a distance of 400 m from **P**, 4s prior to passing through **P**. If $g = 10m/s^2$, then the height above the point **P** from where the body began to fall is (2006)

   a) 720 m

   b) 900 m

   c) 320 m

   d) 680 m

36) The resultant of two forces Pn and $3n$ is a force of $7n$. If the direction of $3n$ force were reversed, the resultant would be $\sqrt{19}n$. The value of P is (2007)

a) $3n$ b) $4n$ c) $5n$ d) $6n$

37) A particle just clears a wall of height b at a distance a and strikes the ground at a distance c from the point of projection. The angle of projection is   (2007)

a) $\tan^{-1}\frac{bc}{a(c-a)}$ b) $\tan^{-1}\frac{bc}{a}$ c) $\tan^{-1}\frac{b}{ac}$ d) $45°$

38) The average marks of boys in class is 52 and that of girls is 42. The average marks of boys and girls combined is 50. The percentage of boys in the class is   (2007)

a) 80   b) 60   c) 40   d) 20

39) A body weighing 13 kg is suspended by two strings 5m and 12 m long, their other ends fixed to the extremities of a rod 13 m long. If the rod be held so that the body hangs immediately below the middle point then the tensions in the strings are: (2007)

a) 5 kg and 12 kg   c) 12 kg and 13 kg
b) 5 kg and 13 kg   d) 5 kg and 5 kg

40) The mean of the numbers a, b, 8, 5, 10 is 6 and the variance is 6.80. Then which one of the following gives the possible values of a and b?   (2008)

a) $a = 0, b = 7$ c) $a = 1, b = 6$
b) $a = 5, b = 2$ d) $a = 3, b = 4$

41) Let p be the statement "x is an irrational number, q be the statement "y is a transcendental number", and r be the statement "x is a rational number if y is a transcendental number".   (2008)
Statement-1: r is equivalent to either q or p
Statement-2: r is equivalent to $\sim (p \leftrightarrow \sim q)$

a) Statement-1 is false, Statement-2 is true
b) Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1
c) Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1
d) Statement-1 is true, Statement-2 is false

42) The statement $p \rightarrow (q \rightarrow p)$ is equivalent to   (2008)

a) $p \rightarrow (p \rightarrow q)$ c) $p \rightarrow (p \wedge q)$
b) $p \rightarrow (p \vee q)$ d) $p \rightarrow (p \leftrightarrow q)$

43) **Statement-1**: $\sim (p \leftrightarrow \sim q)$ is equivalent to $p \leftrightarrow q$
Statement-2: $\sim (p \leftrightarrow \sim q)$ is a tautology   (2009)

a) Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1

b) Statement-1 is true, Statement-2 is false

c) Statement-1 is false, Statement-2 is true

d) Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1

44) **Statement-1**: The variance of the first n even natural numbers is $\frac{n^2-1}{4}$.

Statement-2: The sum of first n natural numbers is $\frac{n(n+1)}{2}$ and the sum of squares of first n natural numbers is $\frac{n(n+1)(2n+1)}{6}$. (2009)

a) Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1

b) Statement-1 is true, Statement-2 is false

c) Statement-1 is false, Statement-2 is true

d) Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1

45) If A, B and C are three sets such that $A \cap B = A \cap C$ and $A \cup B = A \cup C$, then (2009)

a) $A = C$

b) $B = C$

c) $A \cup B = \emptyset$

d) $A = B$