MODEL QUESTIONS – MATHEMATICS

1) The order and degree of the differential equation

$$\frac{d^2y}{dx^2} \quad \frac{d^2y}{dx^2}+3\left(\frac{dy}{dx}\right)^2+2\,y=\log\left(\frac{dy}{dx}\right) \quad \text{are}$$

1) 2 and 2
2) 1 and 2
3) order 2 and degree not defined
4) order not defined but degree is 2

2) Match the following:

	List A	List B
(I)	Example of bijective function	(a) $f(x+y) = f(xy)\ \forall x,y \in R$
(II)	Example of surjective function	(b) $f(x) = x^2$, f: R→R
(III)	Example of neither surjective nor injective function	(c) $f(x) = 2^x$, f: R→(0,∞)
(IV)	Example of a constant function	(d) $f(x) = x^2$, f: R→(0,∞)
		(e) $f(x) = x^2$, f: (0,∞)→R

The correct match of List (A) from List (B) is

	I	II	III	IV
1)	d	b	e	a
2)	c	d	b	a
3)	a	b	e	d
4)	d	c	b	a

3) If $\sin^{-1} x + \sin^{-1} 2x = \pi/3$, then x=
1) $\sqrt{3}\,/\,2\sqrt{7}$
2) $\sqrt{2}\,/\,3\sqrt{7}$
3) $\sqrt{3}\,/\,7\sqrt{2}$
4) $\sqrt{2}\,/\,7\sqrt{3}$

4) The variance of 30 observations is 3. If each of the observations is multiplied by 3, then the variance of the resulting observations is :
1) 3
2) 9
3) 27
4) 81

5) If the sum of two positive numbers is k, then the sum of their squares will be minumum, when the numbers are
1) k/4, k/4
2) k/3, k/3
3) k/2, k/2
4) k,k

6) The inverse of the point (2,3) with respect to the circle $x^2+y^2=16$ is
1) (32/26, 48/26)
2) (32/√26, 48/√26)
3) (32/√13, 48/√13)
4) (32/13, 48/13)

7.   Assertion (A) : The system of linear equations

$x - y + z = 0, x + 2y - z = 0, 2x + y + 3z = 0$ has only trivial solution

Reason(R):   If rank of coefficient matrix is 3, then a system of 3 homogeneous linear equations in three variables has only trivial solution

1) Both A & R are True and R is the correct explanation of A
2) Both A & R are True and R is not correct explanation of A
3) A is True but R is False
4) R is True but A is False

8.   Statement I : $\int\limits_0^{\pi/2} \dfrac{sinx}{sinx + cosx} dx = \dfrac{\pi}{2}$

Statement II : $f(x) dx = ¿ \int\limits_0^a f(a - x) dx.$

$\int\limits_0^a ¿$

1.   Statement I is True but statement II is false
2.   Statement II is True but statement I is false
3.   Statement I and statement II are True
4.   Both Statements I and II are false.

9.   If $\dfrac{3x+4}{(x+1)(x^2+x+1)^2} = \dfrac{A}{x+1} + \dfrac{Bx+C}{x^2+x+1} + \dfrac{Dx+E}{(x^2+x+1)^2}$. , then the value of A is

1. -2
2. -1
3. 1
4. 2