REVISION TEST SERIES

SET A

Class 12 - Mathematics

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 40**

SECTION A

1. Let A = {1, 2, 3,… n} and B = {a, b}. Then the number of surjections from A to B is **[1]**

   a) ${}^nP_2$
   b) none of these
   c) $2^n - 2$
   d) $2^n - 1$

2. If R = {(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)} be a relation on the set A = {1, 2, 3, 4}, then R is **[1]**

   a) reflexive
   b) transitive
   c) a function
   d) not symmetric

3. **Assertion (A):** The relation R in the set A = (1, 2, 3, 4) defined as R = {(x, y): y is divisible by x) is an equivalence relation. **[1]**

   Reason (R): A relation R on the set A is equivalence if it is reflexive, symmetric and transitive.

   a) Both A and R are true and R is the correct explanation of A.
   b) Both A and R are true but R is not the correct explanation of A.
   c) A is true but R is false.
   d) A is false but R is true.

4. The value of $\cos^{-1}\left(\cos\frac{3\pi}{2}\right)$ is equal to **[1]**

   a) $\frac{\pi}{2}$
   b) $\frac{5\pi}{2}$
   c) $\frac{3\pi}{2}$
   d) $\frac{7\pi}{2}$

5. The principal value of $\cot^{-1}(-\sqrt{3})$ is **[1]**

   a) $\frac{2\pi}{6}$
   b) $\frac{5\pi}{6}$
   c) $\frac{\pi}{6}$
   d) $\frac{7\pi}{6}$

6. The principal value of $\cot^{-1}(-1)$ is **[1]**

   a) $\frac{5\pi}{4}$
   b) $\frac{3\pi}{4}$
   c) $\frac{-\pi}{4}$
   d) $\frac{\pi}{4}$

7. Suppose A and B are two events. Event B has occurred and it is known that P(B) < 1. What is P(A/B') equal to? **[1]**

   a) $\frac{P(A)-P(B)}{1-P(B)}$
   b) $\frac{P(A)+P(B')}{1-P(B)}$
   c) $\frac{P(A)-P(AB)}{1-P(B)}$
   d) None of these

8. Three houses are available in a locality. Three persons apply for the houses. Each applies for one house without consulting others. The probability that all the three apply for the same house is **[1]**

   a) $\frac{1}{4}$
   b) $\frac{4}{15}$
   c) $\frac{1}{9}$
   d) $\frac{1}{3}$

9. It has been found that, if A and B play a game 12 times, A wins 6 times, B wins 4 times and they draw twice. A and B take part in a series of 3 games. The probability that they win alternately, is **[1]**

a) $\frac{5}{36}$ b) $\frac{5}{12}$

c) $\frac{5}{27}$ d) $\frac{19}{27}$

10. If P(A) = $\frac{3}{5}$ and P(B) = $\frac{1}{5}$, find P (A ∩ B) if A and B are independent events. **[1]**

a) $\frac{7}{25}$ b) $\frac{3}{25}$

c) $\frac{4}{25}$ d) $\frac{8}{25}$

SECTION B

11. For the principal value, evaluate $\tan^{-1}\left\{2\cos\left(2\sin^{-1}\frac{1}{2}\right)\right\}$. **[2]**

OR

Evaluate:- $\tan^{-1}\left(-\frac{1}{\sqrt{3}}\right)+\cot^{-1}\left(\frac{1}{\sqrt{3}}\right)+\tan^{-1}\left(\sin\left(-\frac{\pi}{2}\right)\right)$

12. There are 3 red and 5 black balls in bag A; and 2 red and 3 black balls in bag B. One ball is drawn from bag A and two from bag B. Find the probability that out of the 3 balls drawn one is red and 2 are black. **[2]**

SECTION C

13. State whether the function is one – one, onto or bijective f: R to R defined by f(x) = 3 – 4x **[3]**

14. Show that the relation R = {(a, b): a > b} on N is transitive but neither reflexive nor symmetric. **[3]**

15. Let d_1, d_2, d_3 be three mutually exclusive diseases. Let S be the set of observable symptoms of these diseases. A doctor has the following information from a random sample of 5000 patients: 1800 had disease d_1, 2100 has disease d_2 and the others had disease d_3.1500 patients with disease d_1, 1200 patients with disease d_2 and 900 patients with disease d_3 showed the symptom. Which of the diseases is the patient most likely to have? **[3]**

16. Given three identical boxes I, II and III each containing two coins. In box-I both coins are gold coins, in box-II, both are silver coins and in the box-III, there is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is of gold, what is the probability that the other coin in the box is also of gold. **[3]**

OR

An insurance company insured 3000 scooters, 4000 cars and 5000 trucks. The probabilities of the accident involving a scooter, a car and a truck are 0.02, 0.03 and 0.04 respectively. One of the insured vehicles meet with an accident. Find the probability that it is a

i. scooter
ii. car
iii. truck

SECTION D

17. Let n be a fixed positive integer. Define a relation R in Z as follows ∀a, b ∈ Z aRb if and only if a-b is divisible by n. Show that R is an equivalence relation. **[5]**

OR

Let A = R – {3} and B = R – {1}. Consider the function f: A ⇒B defined by $f(x)=\left(\frac{x-2}{x-3}\right)$. Is f one-one and onto? Justify your answer.

18. Of the students in a college, it is known that 60% reside in hostel and 40% are day scholars (not residing in hostel). Previous year results report that 30% of all students who reside in hostel attain. A grade and 20% of day scholars attain A grade in their annual exams. At the end of year, one student is chosen at random from the college and he has A grade, what is the probability that the student is a hostlier? **[5]**

SECTION E-CASE BASED QUESTIONS

19. Three machines E_1, E_2, E_3 in a certain factory produced 50%, 25% and 25%, respectively, of the total daily output of electric tubes. It is known that 4% of the tubes produced one each of machines E_1 and E_2 are defective, and that 5% of those produced on E_3 are defective. **[4]**

i. If one tube is picked up at random from a day's production, calculate the probability that it is defective.
ii. Calculate the probability that the defective tube was produced on machine E_1.