Q1. Consider three boxes, each containing 10 balls labelled 1, 2, 3, ..., 10. Suppose one ball is randomly drawn from each of the boxes. Denote by n_i , the label of the ball drawn from the i^{th} box, (i = 1, 2, 3). Then, the number of ways in which the balls can be chosen such that $n_1 < n_2 < n_3$ is _____

(Marks: 4.0)

- O (A) 120
- (B) 240
- O (c) 164
- O (D) 82



Q2. Let P(x) be a function defined on \mathbb{R} such that P'(x) = P'(1-x) for all $x \in [0,1]$, P(0) = 1 and P(1) = 41 then, $\int_0^1 P(x) dx = 1$

(Marks : 4.0)

 \bigcirc (A) $\sqrt{41}$

○ (B) 41

○ (c) 42

O (D) 21

The value of
$$\left(\frac{1+cos\left(\frac{\pi}{n}\right)+i\,sin\left(\frac{\pi}{n}\right)}{1+cos\left(\frac{\pi}{n}\right)-i\,sin\left(\frac{\pi}{n}\right)}\right)^n=$$

Q4. The standard deviation of a distribution is 30 and each item is raised by 3. Then the new standard deviation is



Q5. Which of the following is a viable particulate?

- O (A) Smoke
- O (B) Moulds
- O (c) Dust
- O (D) Mist



 $_{\mbox{\scriptsize Q6.}}$ Which one of the following gives positive carbylamine test?

- (a) 2,4-dimethylaniline
- (B) N,N-dimethylaniline
- (c) N-methyl-4-methylaniline
- O (D) N-methyl aniline



- Q9. A simple pendulum of length L has a period of T on the surface of earth (radius = R). What should be the length of the pendulum, in order to have the same period at an altitude of R above the surface of earth?
- O (A) 4L
- (B) L/4
- (c) L/2
- (D) 2L



- Q10. A circuit connected to an ac source of emf e = e₀ sin(100 t) with t in seconds, gives a phase difference of π/4 between the emf e and current I. Which of the following circuits will exhibit this?
- \bigcirc (a) RL circuit with R = 1 k Ω and L = 1mH
- \bigcirc (B) RC circuit with R = 1 k Ω and C = 1 μF
- \bigcirc (c) RC circuit with R = 1 k Ω and C = 10 μ F
- \bigcirc (D) RL circuit with R = 1 k Ω and L = 10mH

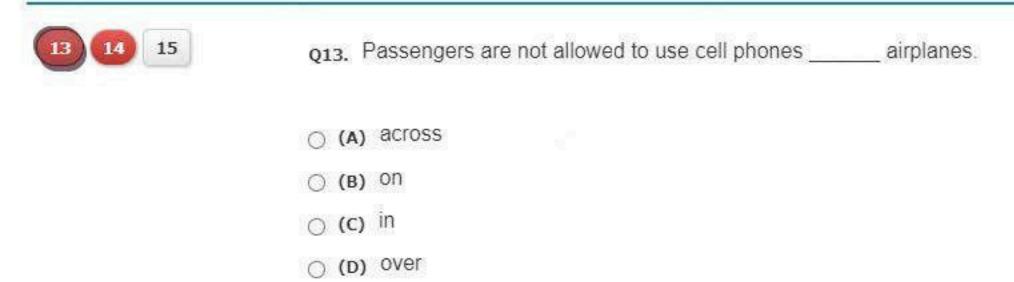


Q11.

A screen is placed 2 m away from a narrow slit which is illuminated with light of wavelength 600 nm. If the first minima lies at a distance of 5 mm on either side of central maximum calculate the slit width (in µm).



Q12. A stone is dropped from the top of a tower 96 m high. At the same time another stone is thrown upwards with a velocity of 24 m/s from the foot of the tower. When will the two stones meet (in seconds)?





- Q14. Identify the grammatically correct sentence among the following:
- O (A) Despite the differences in their age, they were close friends.
- O (B) Despite of the difference in their ages, they were close friends.
- O (c) Despite the difference in their ages, they were close friends.
- (D) In spite the difference in their ages, they were close friends.



(A)	is keeping their fingers crossed	

- (B) washing the dirty linen
- (c) keeping their fingers closed
- (D) washing their hands off