

- Q.1 The order of the differential equation $\frac{d^2y}{dt^2} + \left(\frac{dy}{dt}\right)^3 + y^4 = e^{-t}$ is
- (A) 1 (B) 2 (C) 3 (D) 4

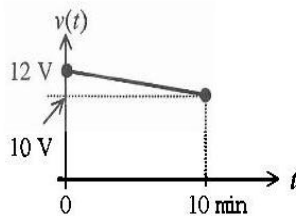
- Q.2 The Fourier series of a real periodic function has only

- P. cosine terms if it is even
 Q. sine terms if it is even
 R. cosine terms if it is odd
 S. sine terms if it is odd

Which of the above statements are correct ?

- (A) P and S (B) P and R (C) Q and S (D) Q and R
- Q.3 A function is given by $f(t) = \sin^2 t + \cos 2t$. Which of the following is true ?
- (A) f has frequency components at 0 and $1/276$ Hz
 (B) f has frequency components at 0 and $1/76$ Hz
 (C) f has frequency components at $1/276$ and $1/\pi$ Hz
 (D) f has frequency components at 0, $1/2\pi$ and $1/76$ Hz

- Q.4 A fully charged mobile phone with a 12 V battery is good for a 10 minute talk-time. Assume that, during the talk-time, the battery delivers a constant current of 2 A and its voltage drops linearly from 12 V to 10 V as shown in the figure. How much energy does the battery deliver during this talk-time ?



- (A) 220 J (B) 12 kJ (C) 13.2 kJ (D) 14.4 kJ
- Q.5 In an n-type silicon crystal at room temperature, which of the following can have a concentration of $4 \times 10^{19} \text{ cm}^{-3}$?
- (A) Silicon atoms (B) Holes (C) Dopant atoms (D) Valence electrons

- Q.6 The full forms of the abbreviations TTL and CMOS in reference to logic families are

- (A) Triple Transistor Logic and Chip Metal Oxide Semiconductor
 (B) Tristate Transistor Logic and Chip Metal Oxide Semiconductor
 (C) Transistor Transistor Logic and Complementary Metal Oxide Semiconductor
 (D) Tristate Transistor Logic and Complementary Metal Oxide Silicon