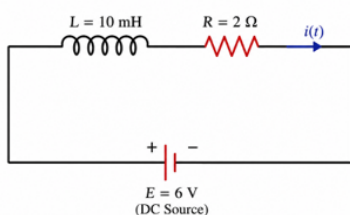


Physics

1. In an L-R circuit, a coil of inductance $L = 10 \text{ mH}$ and resistance $R = 2 \Omega$ is connected in series with a DC voltage source of $E = 6 \text{ V}$. Find the time constant of the circuit and the value of the current at $t = 5 \text{ ms}$.
 (Given $e^{-1} \approx 0.368$)

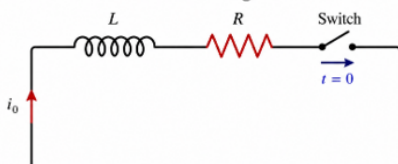
Series L-R Circuit with DC Source



- A) 5 ms, 1.89 A B) 2 ms, 1.20 A
 C) 5 ms, 0.95 A D) 10 ms, 2.15 A

2. An inductor of inductance L carrying an initial current i_0 is allowed to decay through a resistor of resistance R after the switch is closed at $t = 0$. Find the time t at which the heat energy dissipated in the resistor reaches $\frac{3}{4}$ th of its total initial stored magnetic energy.

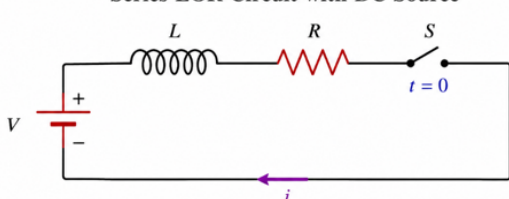
Circuit Diagram



- A) $\frac{L}{R} \ln 2$ B) $\frac{L}{2R} \ln 2$
 C) $\frac{2L}{R} \ln 2$ D) $\frac{L}{R} \ln 4$

3. In a series LR circuit connected to a DC voltage source V , a switch is closed at $t = 0$. Given that the circuit has an inductance L and a resistance R , find the total charge flow through the circuit from $t = 0$ up to the time t when the current flowing in the circuit reaches i .

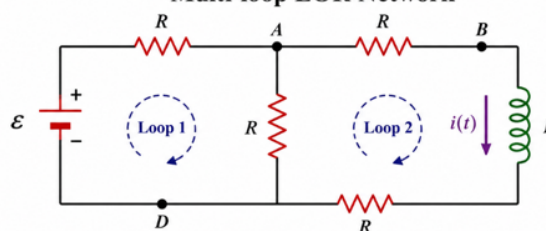
Series LOR Circuit with DC Source



- A) $Q = \frac{Vt + 2Li}{R}$ B) $Q = \frac{Vt - Li}{R}$
 C) $Q = \frac{2Vt - Li}{R}$ D) $Q = \frac{Vt + Li}{R}$

4. In a multi-loop L-R network, a DC source of electromotive force ε is connected to resistors of resistance R and an inductor of inductance L as shown in the circuit. The switch is closed at $t = 0$ when there is initially no current in the inductor. Find the current i flowing through the inductor coil as a function of time.

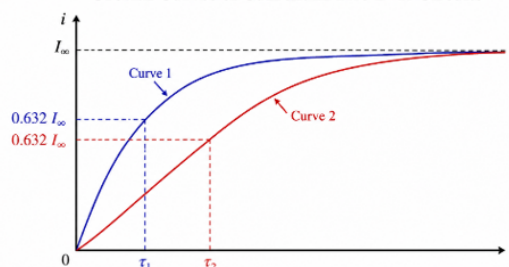
Multi-loop LOR Network



- A) $i = \frac{\varepsilon}{3R} \left(1 - e^{-\frac{3Rt}{2L}} \right)$ B) $i = \frac{\varepsilon}{2R} \left(1 - e^{-\frac{3Rt}{2L}} \right)$
 C) $i = \frac{2\varepsilon}{3R} \left(1 - e^{-\frac{3Rt}{2L}} \right)$ D) $i = \frac{\varepsilon}{R} \left(1 - e^{-\frac{3Rt}{2L}} \right)$

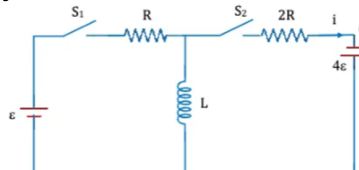
5. For the growth curves of current in two different L-R circuits shown in the graph, which of the two curves has the larger time constant τ ?

Growth Curves of Current in Two L-R Circuits



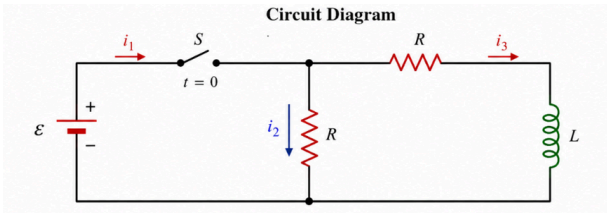
- A) Curve 1 B) Curve 2
 C) Both have the same time constant D) Cannot be determined

6. From the image given below, in the circuit shown, S_1 remains closed for a long time and S_2 remains open. Now S_2 is closed and S_1 is opened. Find out the $\frac{di}{dt}$ just after that moment.



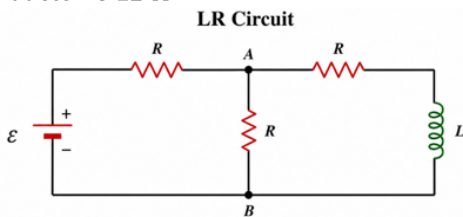
- A) $\frac{di}{dt} = \frac{3\varepsilon}{L}$ B) $\frac{di}{dt} = \frac{5\varepsilon}{L}$
 C) $\frac{di}{dt} = \frac{4\varepsilon}{L}$ D) $\frac{di}{dt} = \frac{2\varepsilon}{L}$

7. In the circuit shown, a switch is closed at $t = 0$. Find the currents i_1, i_2, i_3 and the rate of change of current $\frac{di_3}{dt}$ at $t = 0$ and at $t = \infty$, given that initially all currents are zero.



- A) At $t = 0$: $i_1 = i_2 = \frac{\varepsilon}{2R}$, $i_3 = 0$, $\frac{di_3}{dt} = \frac{\varepsilon}{L}$; At $t = \infty$: $i_1 = i_3 = \frac{\varepsilon}{2R}$, $i_2 = 0$, $\frac{di_3}{dt} = 0$
- B) At $t = 0$: $i_1 = i_2 = \frac{\varepsilon}{R}$, $i_3 = 0$, $\frac{di_3}{dt} = \frac{\varepsilon}{2L}$; At $t = \infty$: $i_1 = i_3 = \frac{\varepsilon}{R}$, $i_2 = \frac{\varepsilon}{R}$, $\frac{di_3}{dt} = 0$
- C) At $t = 0$: $i_1 = i_2 = 0$, $i_3 = \frac{\varepsilon}{2R}$, $\frac{di_3}{dt} = 0$; At $t = \infty$: $i_1 = i_3 = 0$, $i_2 = \frac{\varepsilon}{2R}$, $\frac{di_3}{dt} = \frac{\varepsilon}{L}$
- D) At $t = 0$: $i_1 = i_2 = \frac{\varepsilon}{2R}$, $i_3 = \frac{\varepsilon}{R}$, $\frac{di_3}{dt} = 0$; At $t = \infty$: $i_1 = i_3 = \frac{\varepsilon}{R}$, $i_2 = 0$, $\frac{di_3}{dt} = \frac{\varepsilon}{2L}$

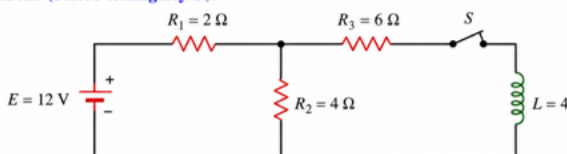
8. In the LR circuit shown in the image, an inductor of inductance $L = 12$ H and a resistor of resistance R are connected in a network. What is the time constant τ of the circuit connected to the inductor branch, given that the equivalent resistance seen by the inductor is 12Ω ?



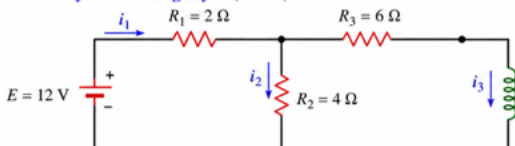
- A) 0.5 s B) 1 s
C) 2 s D) 4 s

9. In the circuit shown, an emf source $E = 12$ V, resistors $R_1 = 2 \Omega$, $R_2 = 4 \Omega$, $R_3 = 6 \Omega$, and an inductor $L = 4$ H are connected. What are the values of currents i_1, i_2 , and i_3 immediately after the key S is closed?

Circuit (before closing key S):



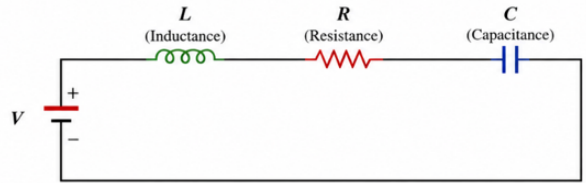
Immediately after closing key S ($t = 0^+$):



- A) 2.0 amp, 2.0 amp, 0 amp B) 2.0 amp, 2.0 amp, 2.0 amp
C) 2.0 amp, 0 amp, 0 amp D) 2.0 amp, 2.0 amp, 1.0 amp

10. What are the dimensions of the combination $\frac{L^2}{CVR}$, where L is inductance, C is capacitance, V is electric potential difference (voltage), and R is resistance?

LCR Series Circuit

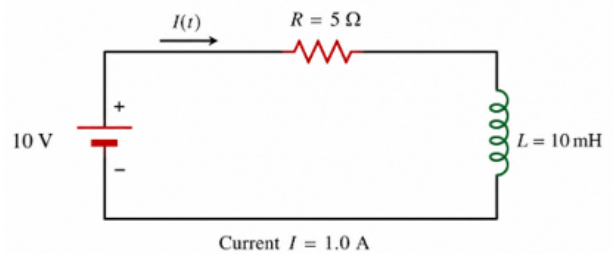


- A) $[M^0 L^0 T^0 A^1]$ B) $[M^0 L^0 T^0 A^2]$
C) $[M^{-1} L^{-2} T^4 A^3]$ D) $[M^0 L^0 T^0 A^{-1}]$

11. A coil of inductance $L = 10$ mH and resistance $R = 5 \Omega$ is connected to a 10 V battery in series. At what time t will the current in the coil reach 1.0 A? (Given $\ln(0.5) = -0.693$)

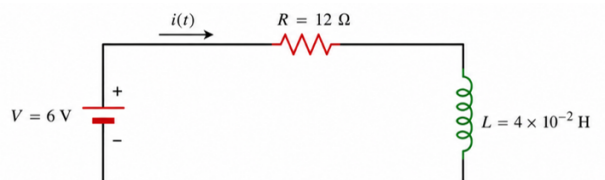
RL Circuit

A coil of inductance $L = 10$ mH and resistance $R = 5 \Omega$ is connected to a 10 V battery in series.



- A) 1.39 ms B) 0.69 ms
C) 2.77 ms D) 3.46 ms

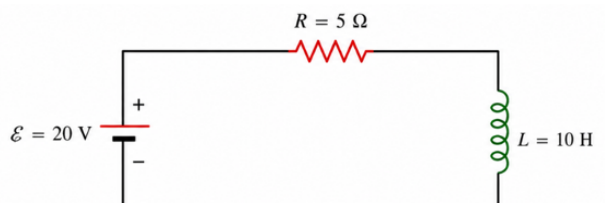
12. A coil of inductance $L = 4 \times 10^{-3}$ H and resistance $R = 12 \Omega$ is abruptly supplied a potential of 6 V. What will be the rate of change of current in 0.001 s? (Given $e^{-3} = 0.05$)



At $t = 0$: Switch (not shown) is closed and the 6 V potential is applied abruptly.

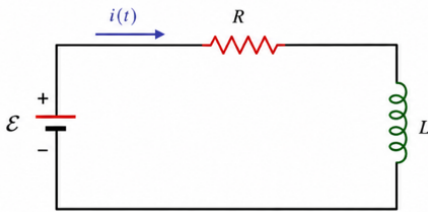
- A) 500 amp/sec. B) 75 amp/sec.
C) 250 amp/sec. D) 150 amp/sec.

13. An inductor of inductance $L = 10$ H and a resistor of resistance $R = 5 \Omega$ are connected in series with a battery of emf $E = 20$ V. What is the initial rate of change of current when the circuit is switched on at $t = 0$?



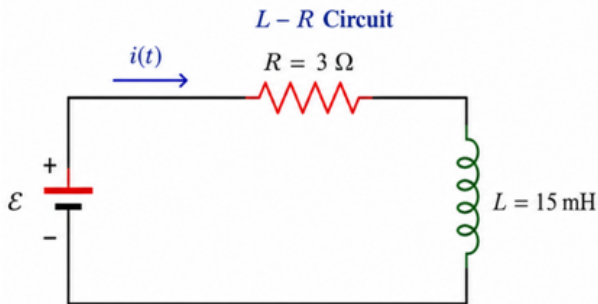
- A) 0.5 amp/s B) 1.0 amp/s
C) 2.0 amp/s D) 4.0 amp/s

14. In an $L - R$ circuit, after how many time constants will the current in the circuit reach 95% of its maximum steady-state value? (Given $\ln(0.05) \approx -3$)



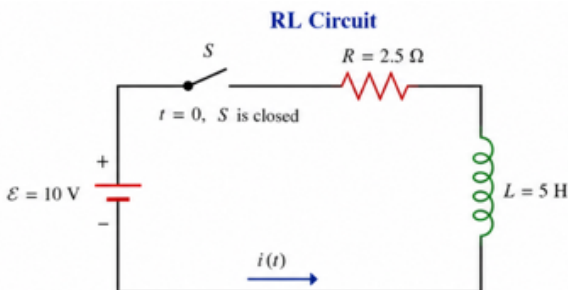
- A) 1τ** **B) 2τ**
C) 3τ **D) 5τ**

- 15. An $L - R$ circuit consists of an inductance of 15 mH and a resistance of $3\ \Omega$. What is the time constant of the circuit?**



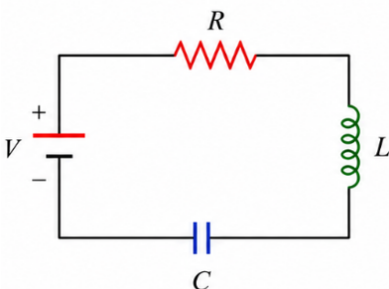
- A) 5 ms** **B) 12 ms**
C) 45 ms **D) 500 s**

- 16. A coil of inductance $L = 5 \text{ H}$ and resistance $R = 2.5 \, \Omega$ is connected to a 10 V battery in series. What is the current in the circuit at $t = 2$ seconds after the switch is closed?**



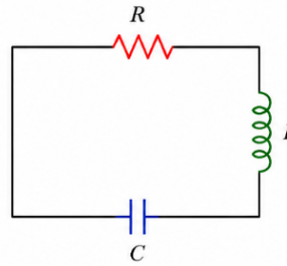
- A)** $4e^{-1}$ A **B)** $4(1 - e^{-1})$ A
C) $2(1 - e^{-2})$ A **D)** $4(1 - e)$ A

17. Let L , C , and R represent inductance, capacitance, and resistance, respectively. Identify the combination that has the dimensions of time.



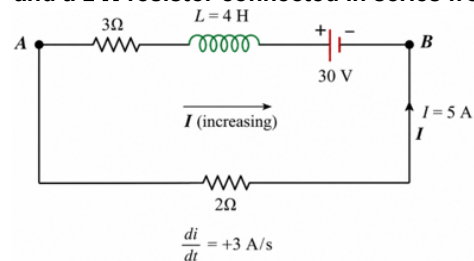
- A)** RC **B)** $\frac{R}{L}$
C) $\frac{1}{\sqrt{LC}}$ **D)** $\frac{C}{L}$

18. Let L , C , and R denote inductance, capacitance, and resistance, respectively. Select the combination that has the dimensions of frequency.



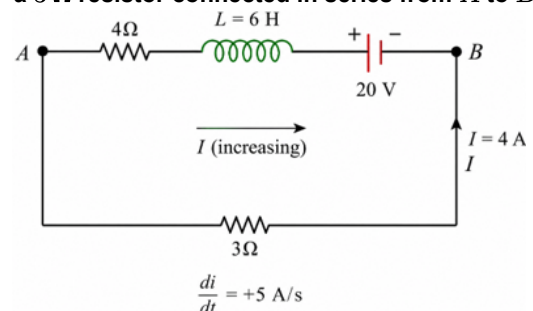
- A) RC** **B) $\frac{R}{L}$**
C) $\sqrt{LC}$ **D) $\frac{C}{L}$**

- 19. Find the potential difference $V_A - V_B$ for the circuit segment shown, given that the current flowing from A to B is $I = 5$ A and is increasing at the rate $\frac{di}{dt} = +3$ A/s. The circuit consists of a $3\ \Omega$ resistor, an inductor of inductance $L = 4$ H, a 30 V battery, and a $2\ \Omega$ resistor connected in series from A to B .**



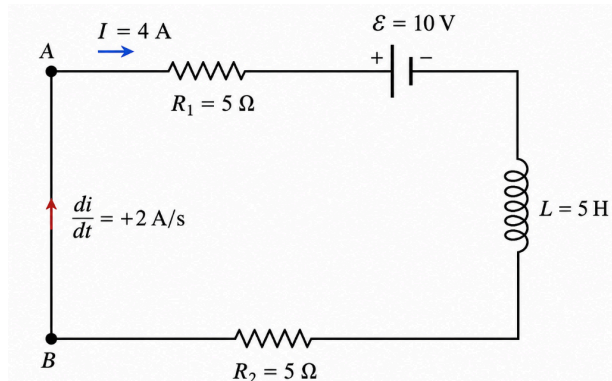
- A)** -38 V **B)** 57 V
C) -52 V **D)** -60 V

- 20. Find the potential difference $V_A - V_B$ for the circuit segment shown, given that the current flowing from A to B is $I = 4 \text{ A}$ and is increasing at the rate $\frac{di}{dt} = +5 \text{ A/s}$. The circuit consists of a 4Ω resistor, a 20 V battery, an inductor of inductance $L = 6 \text{ H}$, and a 3Ω resistor connected in series from A to B .**



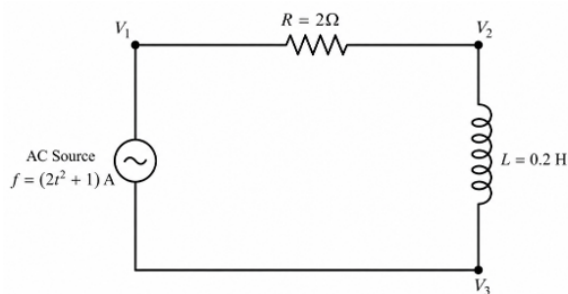
- A) -38 V** **B) -47 V**
C) -55 V **D) -62 V**

21. Find the potential difference $V_A - V_B$ in the given circuit if the rate of change of current is $\frac{di}{dt} = +2 \text{ A/s}$ and the current in the circuit is $I = 4 \text{ A}$. The circuit elements from A to B are: a resistor of 5Ω , a cell of emf 10 V (with its positive terminal facing left), another resistor of 5Ω , and an inductor of $L = 5 \text{ H}$.



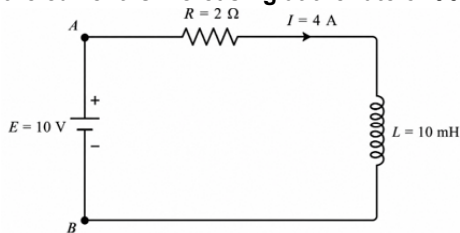
- A) 30 V B) 55 V
C) 80 V D) 85 V

22. Find the potential difference $V_A - V_B$ in the given circuit at $t = 3 \text{ s}$ if the current is given by $I = (2t^2 + 1) \text{ A}$, the inductance is $L = 0.2 \text{ H}$, and the resistances are 2Ω and 5Ω connected in series with the inductor.



- A) 135.4 V B) 45.2 V
C) 52.4 V D) 61.8 V

23. Find the potential difference $V_A - V_B$ in the given circuit if the current is $I = 4 \text{ A}$, the emf is $E = 10 \text{ V}$, resistance is $R = 2 \Omega$, inductance is $L = 10 \text{ mH}$, and the current is increasing at the rate of 500 A/s .

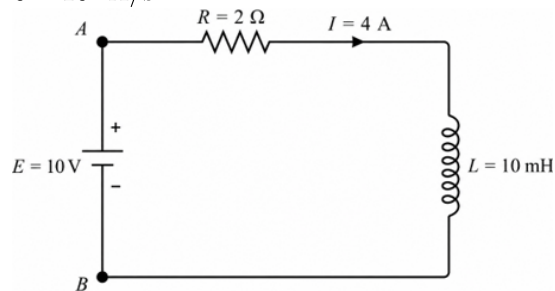


- A) 13 V B) 21 V
C) 25 V D) 30 V

24. A solenoid has the self-inductance $L_1 = 4 \text{ H}$. If the length of the solenoid is doubled while keeping the turn density and cross-sectional area constant, the new self-inductance is:

- A) 2H B) 4H
C) 8H D) 16H

25. Find the potential difference $V_A - V_B$ in the given circuit if the current is $I = 4 \text{ A}$, the emf is $E = 10 \text{ V}$, resistance is $R = 2 \Omega$, inductance is $L = 10 \text{ mH}$, and the current is decreasing at the rate of $5 \times 10^2 \text{ A/s}$.



- A) 13 V B) 18 V
C) 23 V D) 28 V

26. A coil of inductance 3 H carries a current of 4.5 A . The magnetic flux in webers through the coil is:

- A) 1.35 B) 9.0
C) 10.5 D) 13.5

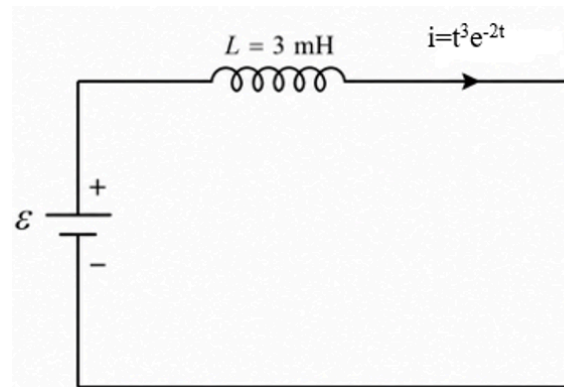
27. A solenoid is wound over a cylindrical frame. If all the linear dimensions of the frame are increased by a factor of 2 while keeping the number of turns per unit length constant, the self-inductance increases by a factor of:

- A) 2 B) 4
C) 8 D) 16

28. A solenoid has the self-inductance $L_1 = 3 \text{ H}$. If the length of the solenoid is tripled while keeping the turn density and cross-sectional area constant, the new self-inductance is:

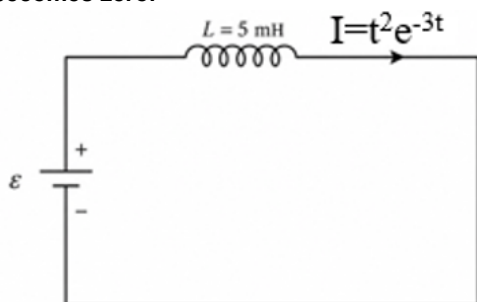
- A) 1 H B) 3 H
C) 9 H D) 27 H

29. For a coil having self-inductance $L = 3 \text{ mH}$, the current flowing through it is given by $i = t^3 e^{-2t}$. Find the time at which the induced emf becomes zero.



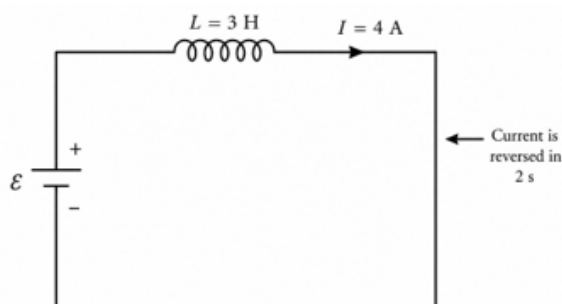
- A) 1.5 sec. B) 2.0 sec.
C) 3.0 sec. D) 0.5 sec.

30. For a coil of self-inductance $L = 5 \text{ mH}$, the current passing through it varies with time as $I = t^2 e^{-3t}$. Find the time at which the induced emf in the coil becomes zero.



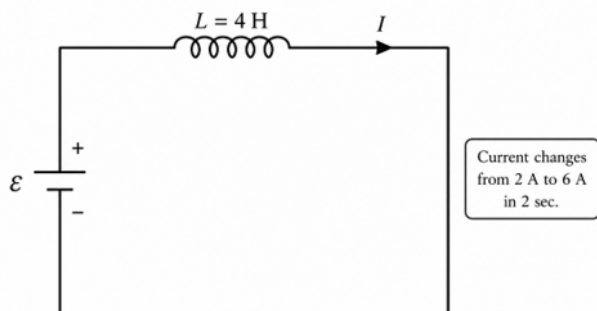
- A) $\frac{2}{3}$ sec. B) $\frac{3}{2}$ sec.
C) 3 sec. D) $\frac{1}{3}$ sec.

31. Find the induced emf in a coil of self-inductance 3 H carrying a 4 A current when the direction of the current is reversed in 2 sec.



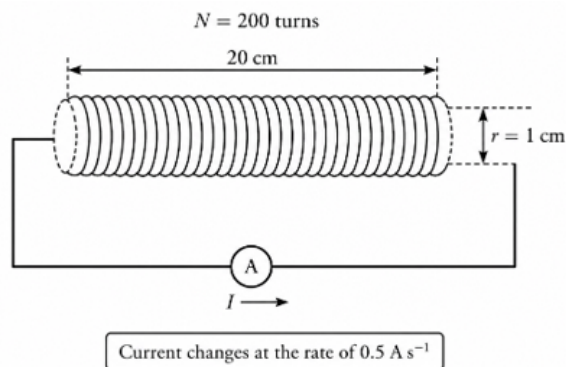
- A) -12 V B) 12 V
C) -6 V D) 6 V

32. Find the magnitude of the induced emf in a coil of self-inductance 4 H when the current changes from 2 A to 6 A in 2 sec.



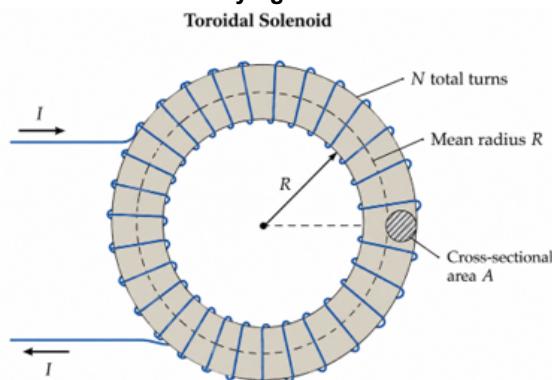
- A) 8 V B) 4 V
C) 2 V D) 16 V

33. Find the magnitude of the emf induced in a solenoid of 300 turns, having a length of 20 cm and a radius of 1 cm, when the current changes at the rate of 0.5 A s^{-1} .



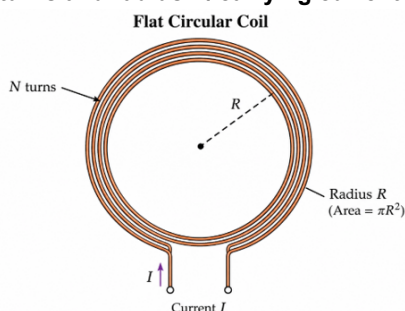
- A) $2.96 \times 10^{-4} \text{ V}$ B) $1.78 \times 10^{-4} \text{ V}$
C) $5.92 \times 10^{-4} \text{ V}$ D) $8.88 \times 10^{-4} \text{ V}$

34. Find the self-inductance L of a toroidal solenoid of total turns N , mean radius R , and uniform cross-sectional area A carrying current I .



- A) $L = \frac{\mu_0 N^2 A}{2\pi R}$ B) $L = \frac{\mu_0 N A}{2\pi R}$
C) $L = \frac{\mu_0 N^2 A}{\pi R}$ D) $L = \frac{\mu_0 N^2 R}{2\pi A}$

35. Find the self-inductance of a flat circular coil of N turns and radius R carrying current I .



- A) $L = \frac{\mu_0 N^2 \pi R}{2}$ B) $L = \frac{\mu_0 N \pi R}{2}$
C) $L = \frac{\mu_0 N^2 \pi R^2}{2}$ D) $L = \frac{\mu_0 N^2 R}{2\pi}$

36. Find the potential difference $V_A - V_B$ in the given circuit if the rate of change of current is $\frac{di}{dt} = +2 \text{ A/s}$ and the current in the circuit is $I = 3 \text{ A}$. The circuit elements from A to B are: a resistor of 5Ω , a cell of emf 10 V (with its positive terminal facing left), another resistor of 5Ω , and an inductor of $L = 10 \text{ H}$.

- A) 50 V B) 60 V
C) 70 V D) 80 V

37. Find the potential difference $V_A - V_B$ in the given circuit if the rate of change of current is $\frac{di}{dt} = +3 \text{ A/s}$ and the current in the circuit is $I = 4 \text{ A}$. The circuit elements from A to B are: a resistor of 2Ω , a cell of emf 20 V (with its positive terminal facing left), another resistor of 3Ω , and an inductor of $L = 5 \text{ H}$.

- A) 45 V B) 55 V
C) 65 V D) 75 V

38. A solenoid has the self-inductance $L_1 = 3 \text{ H}$. If the length of the solenoid is tripled while keeping the turn density and cross-sectional area constant, the new self-inductance is:

- A) 1 H B) 3 H
C) 9 H D) 27 H

39. A solenoid has the self-inductance $L_1 = 4 \text{ H}$. If the radius of the solenoid is doubled while keeping the turn density and length constant, the new self-inductance is:

- A) 4 H B) 8 H
C) 16 H D) 32 H

40. A coil of inductance 5 H carries a current of 3 A . The magnetic flux in webers through the coil is:

- A) 1.67 B) 8
C) 15 D) 30

41. A coil of inductance 4 H carries a current of 2.5 A . The magnetic flux in webers through the coil is:

- A) 1.6 B) 6.5
C) 10 D) 20

42. A solenoid is wound over a cylindrical frame. If all the linear dimensions of the frame are increased by a factor of 3 while keeping the number of turns per unit length constant, the self-inductance increases by a factor of:

- A) 3 B) 9
C) 27 D) 81

43. A solenoid is wound over a cylindrical frame. If all the linear dimensions of the frame are increased by a factor of 2 while keeping the total number of turns (N) constant, the self-inductance increases by a factor of:

- A) 0.5 B) 2
C) 4 D) 8

44. A solenoid has the self-inductance $L_1 = 2 \text{ H}$. If the length of the solenoid is doubled while keeping the turn density and cross-sectional area constant, the new self-inductance is:

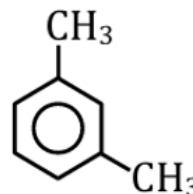
- A) 1 H B) 2 H
C) 4 H D) 8 H

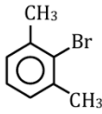
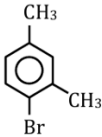
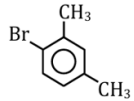
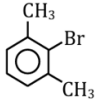
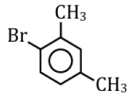
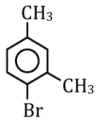
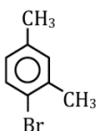
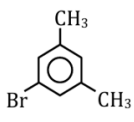
45. A solenoid has the self-inductance $L_1 = 5 \text{ H}$. If the length of the solenoid is tripled while keeping the turn density and cross-sectional area constant, the new self-inductance is:

- A) 1.67 H B) 5 H
C) 15 H D) 45 H

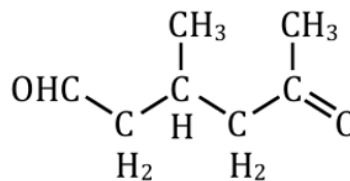
Chemistry

46. What products are formed when o-xylene is treated with Br_2 in the presence of FeBr_3 ?

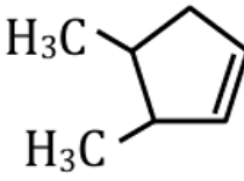
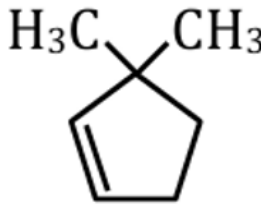
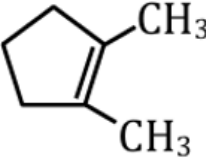
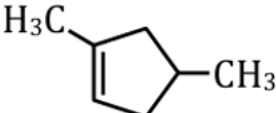


- A)  and  B)  and 
C)  and  D)  and 

47. A single compound of the structure

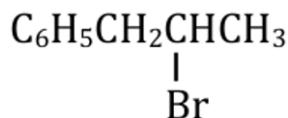


is obtainable from ozonolysis of which of the following cyclic compounds?

- A)  B) 
C)  D) 

48. The reaction of $C_6H_5CH=CHCH_3$ with HBr produces:

- A) $C_6H_5CH_2CH_2CH_2CH_2Br$

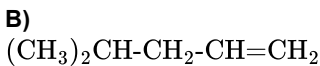


- C) $CH=CHCH_3$



49. 2,3-Dimethyl-2-butene can be prepared by heating which of the following compounds with a strong acid?

- A) $(CH_3)_2C=CH-CH_2-CH_3$



- C) $(CH_3)_2CH-CH-CH=CH_2$

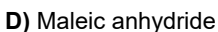


50. The oxidation of benzene by V_2O_5 in the presence of air produces:

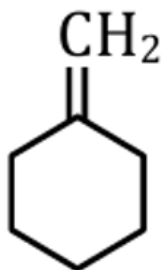
- A) Benzoic acid



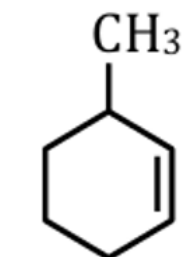
- C) Benzoic anhydride



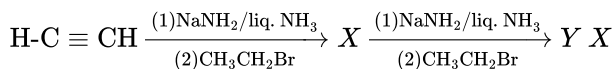
51. In the reaction with HCl , an alkene reacts in accordance with the Markovnikov's rule to give a product 1-chloro-1-methylcyclohexane. The possible alkene is:



- B) CH_3



52. In the reaction:



and Y are:

- A) $X = 1\text{-Butyne}; Y = 3\text{-Hexyne}$

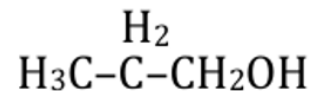
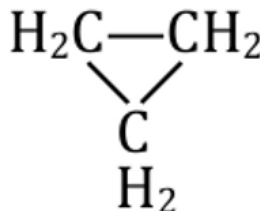
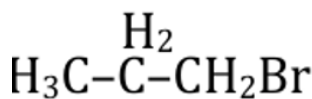
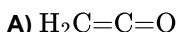


53. Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_3 . If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be:

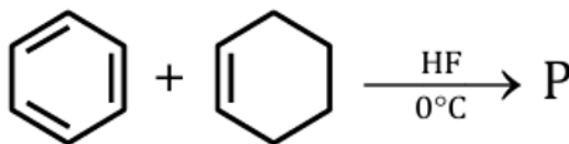
- A) Faster



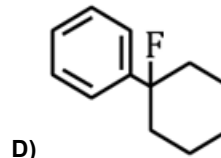
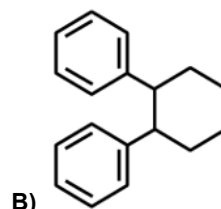
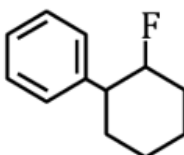
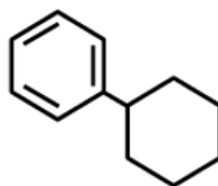
54. Which of the following compounds shall not produce propene by reaction with HBr followed by elimination or direct only by elimination reaction?



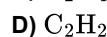
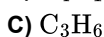
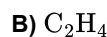
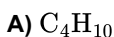
55. In the given reaction:



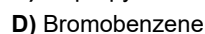
The product P is:



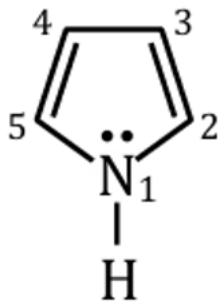
56. The compound that will react most readily with gaseous bromine has the formula:



57. Which of the following can be used as the halide component for Friedel-Crafts reaction?

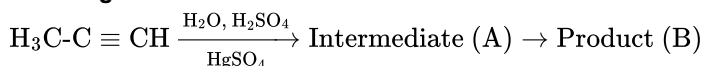


58. In pyrrole, the electron density is maximum on:



- A) 2 and 4
B) 2 and 5
C) 2 and 3
D) 3 and 4

59. Predict the correct intermediate and product in the following reaction:

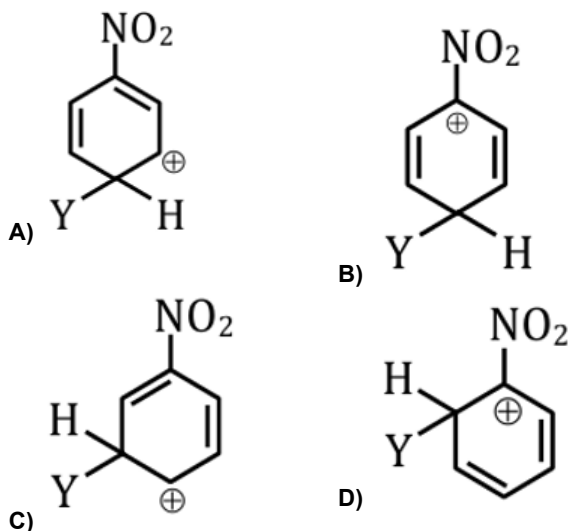


- A) $\text{A} : \text{H}_3\text{C}-\text{C}(\text{OH})=\text{CH}_2$ B) $\text{A} : \text{H}_3\text{C}-\text{C}(\text{SO}_4)=\text{CH}_2$ C) $\text{A} : \text{H}_3\text{C}-\text{C}(\text{OH})=\text{CH}_2$ D) $\text{A} : \text{H}_3\text{C}-\text{C}(\text{SO}_4)=\text{CH}_2$
 $\text{B} : \text{H}_3\text{C}-\text{C}(\text{SO}_4)=\text{CH}_2$ $\text{B} : \text{H}_3\text{C}-\text{C}(\text{OH})=\text{CH}_2$ $\text{B} : \text{H}_3\text{C}-\text{C}(\text{OH})=\text{CH}_2$ $\text{B} : \text{H}_3\text{C}-\text{C}(\text{OH})=\text{CH}_2$

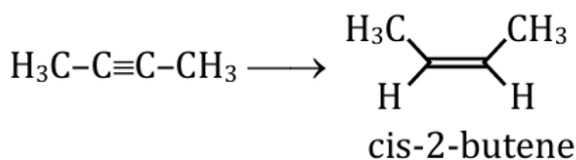
60. Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is:

- A) $\text{CH}\equiv\text{CH}$ B) $\text{CH}_2=\text{CH}_2$
C) CH_3-CH_3 D) CH_4

61. Which of the following carbocations is expected to be most stable?

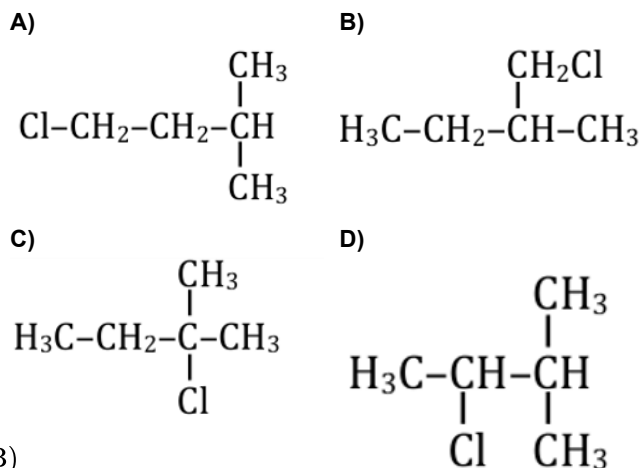


62. The most suitable reagent for the following conversion is:-

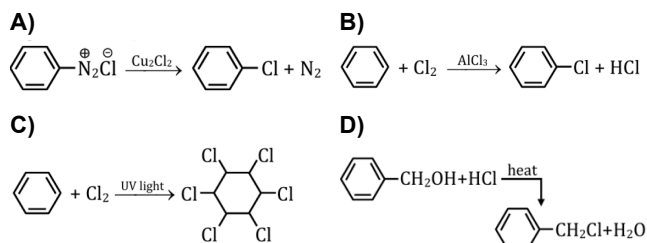


- A) Na/liquid NH_3 B) H_2 , Pd/C, quinoline
C) Zn/HCl D) $\text{Hg}^{2+}/\text{H}^+$, H_2O

63. An alkene "A" on reaction with O_3 and $\text{Zn-H}_2\text{O}$ gives propanone and ethanal in equimolar ratio. Addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is:



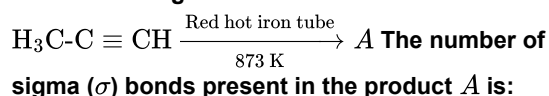
64. Among the following, the reaction that proceeds through an electrophilic substitution is:



65. The alkane that gives only one mono-chloro product on chlorination with Cl_2 in presence of diffused sunlight is:

- A) 2, 2-dimethylbutane B) Neopentane
C) n-pentane D) Isopentane

66. In the following reaction:

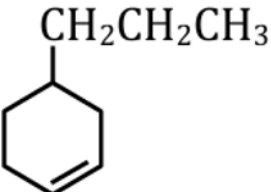
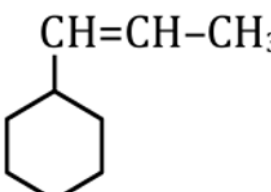
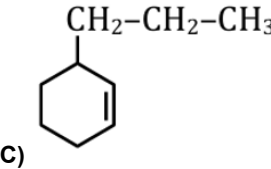
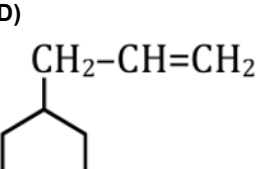


- The number of sigma (σ) bonds present in the product A is:
A) 21 B) 9
C) 24 D) 18

67. Which of the following alkanes cannot be made in good yield by the Wurtz reaction?

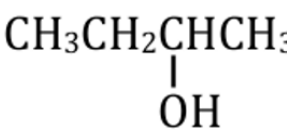
- A) n-Butane B) n-Hexane
C) 2, 3-Dimethylbutane D) n-Heptane

68. An alkene on ozonolysis gives methanal as one of the products. Its structure is:

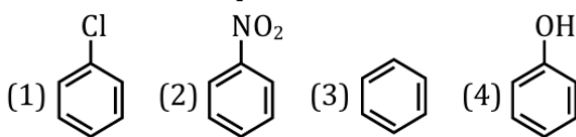
- A)  B) 
- C)  D) 

69. In the reaction: $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 \xrightarrow[\text{H}_2\text{O}_2, \text{OH}^-]{\text{B}_2\text{H}_6} \text{Z}$

What is Z?

- A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ B) 
- C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$ D) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

70. Which of the following compounds is most reactive in electrophilic aromatic substitution?



- A) 1 B) 2
C) 3 D) 4

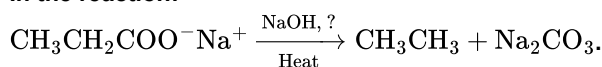
71. Which of the following is a free radical substitution reaction?

- A) Benzene with $\text{Br}_2/\text{AlCl}_3$ B) Acetylene with HBr
C) Methane with $\text{Br}_2/h\nu$ D) Propene with $\text{HBr}/(\text{C}_6\text{H}_5\text{COO})_2$

72. The major product formed in the dehydrohalogenation reaction of 2-bromopentane is pent-2-ene. This product formation is based on:

- A) Saytzeff's Rule B) Hund's Rule
C) Hoffmann Rule D) Huckel's Rule

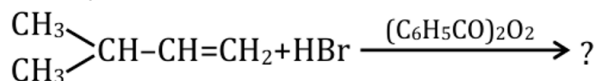
73. In the reaction:

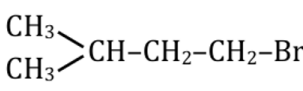
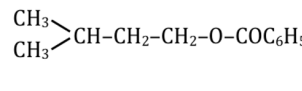
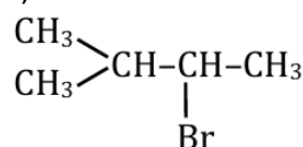
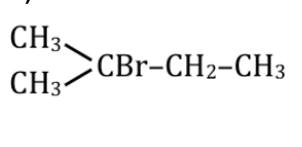


Consider the above reaction and identify the missing reagent/chemical is:

- A) B_2H_6 B) Red Phosphorus
C) CaO D) DIBAL-H

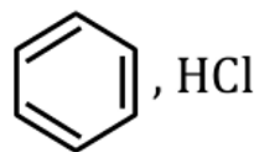
74. The major product of the chemical reaction is:

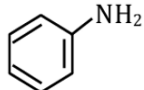


- A)  B) 
- C)  D) 

75. Which of the following is suitable to synthesize chlorobenzene?

- A) Phenol, NaNO_2 , HCl, CuCl



- C) , HCl, Heating

- B)  D) Benzene, Cl_2 , anhydrous FeCl_3

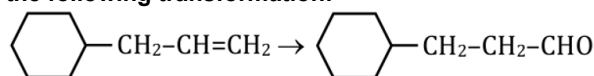
76. Compound X on reaction with O_3 followed by $\text{Zn}/\text{H}_2\text{O}$ gives formaldehyde and 2-methylpropanal as products. The compound X is:

- A) 2-Methylbut-1-ene B) 2-Methylbut-2-ene
C) Pent-2-ene D) 3-Methylbut-1-ene

77. Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is:

- A) 32 B) 30
C) 18 D) 16

78. Identify the correct reagents that would bring about the following transformation:



- A) (i) $\text{H}_2\text{O}/\text{H}^+$, (ii) CrO_3 B) (i) BH_3 , (ii) $\text{H}_2\text{O}_2/\text{OH}^-$, (iii) PCC
C) (i) BH_3 , (ii) $\text{H}_2\text{O}_2/\text{OH}^-$, (iii) Alk. KMnO_4 D) (i) $\text{H}_2\text{O}/\text{H}^+$, (ii) PCC

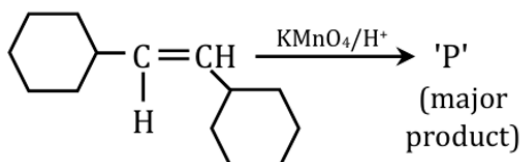
79. A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its IUPAC name is:

- A) n-hexane B) 2-methylpentane
C) 2, 3-dimethylbutane D) 2, 2-dimethylbutane

80. Given below are two statements: **Statement-I:** The boiling point of three isomeric pentanes follows the order: n-pentane > isopentane > neopentane. **Statement-II:** When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point.

- A) Both Statement-I and Statement-II are correct
 B) Both Statement-I and Statement-II are incorrect
 C) Statement-I is correct but Statement-II is incorrect
 D) Statement-I is incorrect but Statement-II is correct

81. For the given reaction:

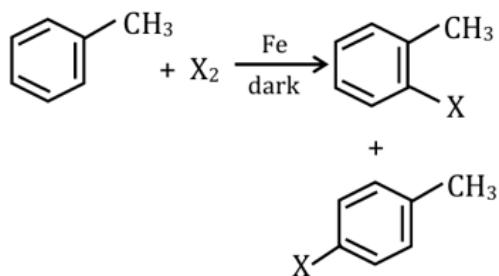


- A) C1CCCCC1C=O B) C1CCCCC1C(=O)O
 C) C1CCCCC1C(O)C(O)C1 D) C1CCCCC1C(=O)C(=O)C1

82. Baeyer's reagent is:

- A) Acidic potassium permanganate solution
 B) Acidic potassium dichromate solution
 C) Cold, dilute, aqueous solution of potassium permanganate
 D) Hot, concentrated solution of potassium permanganate

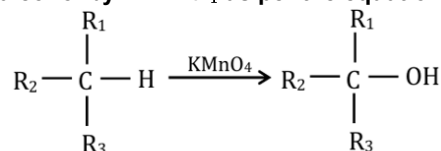
83. The following reaction method:



is not suitable for the preparation of the corresponding haloarene products, due to high reactivity of halogen, when X is:

- A) F B) I
 C) Cl D) Br

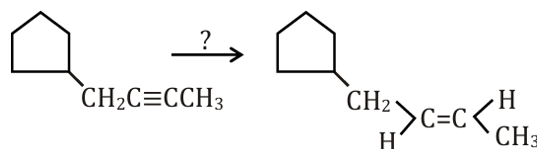
84. The alkane that can be oxidized to the corresponding alcohol by KMnO_4 as per the equation:



is, when:

- A) $\text{R}_1 = \text{H}; \text{R}_2 = \text{H}; \text{R}_3 = \text{H}$ B) $\text{R}_1 = \text{CH}_3; \text{R}_2 = \text{CH}_3; \text{R}_3 = \text{Cl}$
 C) $\text{R}_1 = \text{CH}_3; \text{R}_2 = \text{H}; \text{R}_3 = \text{H}$ D) $\text{R}_1 = \text{CH}_3; \text{R}_2 = \text{CH}_3; \text{R}_3 = \text{H}$

85. Reagent used to carry out the following alkyne to trans-alkene is:



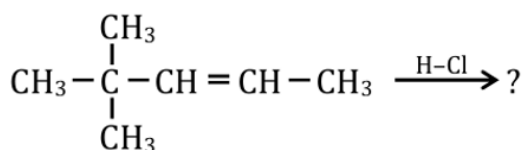
- A) $\text{Pd-C}/\text{H}_2$ B) $\text{Na}/\text{liquid NH}_3$
 C) Pd/H_2 D) Ni/H_2

86. Match the Column-I with Column-II:

Column-I		Column-II	
(a)	Lindlar's catalyst	(p)	$\text{Na}/\text{liq. NH}_3$
(b)	Birch catalyst	(q)	$\text{H}_2/\text{Pd-CaCO}_3$
(c)	Baeyer's Reagent	(r)	$\text{HBr}/(\text{PhCO})_2\text{O}_2$
(d)	Kharasch effect	(s)	$\text{Dil. KMnO}_4/273\text{K}$

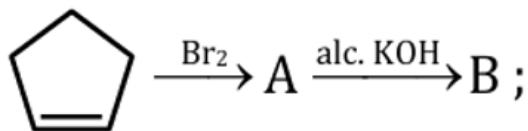
- A) a - q, b - p, c - r, d - s
 B) a - p, b - q, c - s, d - r
 C) a - q, b - p, c - s, d - r
 D) a - p, b - q, c - r, d - s

87. In the reaction:



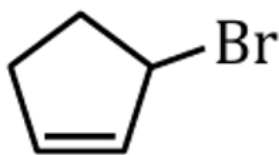
- A) CC(C)(C)CC(C)C B) CC(C)(C)CC(C)C
 C) CC(C)(C)CC(C)C D) CC(C)(C)CC(C)C

88. In the reaction:



What is the structure of B?

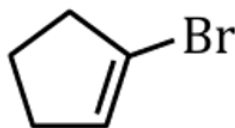
A)



B)



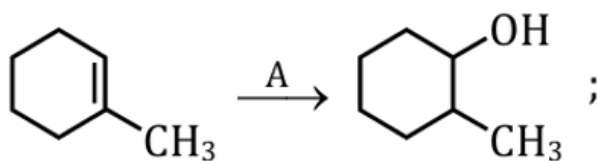
C)



D)



89.



Reagent 'A' is

A) $\text{BH}_3, \text{H}_2\text{O}_2/\text{OH}^-$

B) $\text{H}_2\text{O}/\text{H}^+$

C) $\text{Hg}^{2+}, \text{H}_2\text{O}/\text{NaBH}_4$

D) $\text{Cl}_2/\text{aq. NaOH}$

90. Consider the following reaction pathways starting

from propene: $\text{CH}_3\text{-CH=CH}_2 \xrightarrow{\text{dil. H}_2\text{SO}_4} \text{A}$

$\text{CH}_3\text{-CH=CH}_2 \xrightarrow[\text{OH}^-]{\text{B}_2\text{H}_6, \text{H}_2\text{O}_2} \text{B}$ Choose the wrong

statement about the products A and B:

A) A and B have the same functional group

B) A and B are position isomers

C) A and B show chain isomerism

D) Mixed ether is the functional isomer of both A and B

Botany

91. The two core techniques that enabled the birth of modern biotechnology are:

A) Fermentation and downstream processing

B) Genetic engineering and maintenance of sterile ambience

C) Tissue culture and DNA fingerprinting

D) Gel electrophoresis and PCR

92. Which of the following components is essential to initiate DNA replication in a host cell so that a foreign DNA piece can replicate?

A) Selectable marker

B) Restriction site

C) Origin of replication (ori)

D) Promotor sequence

93. The construction of the first recombinant DNA was accomplished by linking an antibiotic resistance gene with a native plasmid of:

A) Escherichia coli

B) Salmonella typhimurium

C) Agrobacterium

D) Thermus aquaticus

tumefaciens

94. The three basic steps in genetically modifying an organism include all of the following, EXCEPT:

A) Identification of DNA with desirable genes

B) Introduction of the identified DNA into the host

C) Maintenance of introduced DNA in the host and transfer of the DNA to its progeny

D) Isolation of the protein product using downstream processing

95. The first restriction endonuclease to be isolated and characterized, whose functioning depended on a specific DNA nucleotide sequence, was:

A) EcoRI

B) HindII

C) BamHI

D) PstI

96. In the nomenclature of restriction enzymes, such as EcoRI, the Roman numeral 'I' indicates:

A) The order in which the enzyme was isolated from that strain of bacteria

B) The number of restriction sites present on the plasmid

C) The strain of the microbe used

D) The number of polypeptide chains in the enzyme

97. Restriction endonucleases inspect the DNA length and bind to specific sequences called:

A) Satellite DNA sequences

B) Promotor sequences

C) Palindromic nucleotide sequences

D) Poly-A tail sequences

98. Exonucleases differ from endonucleases in that exonucleases:

A) Make cuts at specific positions within the DNA

B) Remove nucleotides from the ends of the DNA molecule

C) Join two sticky ends together

D) Cleave only single-stranded RNA molecules

99. Restriction enzymes cut the strand of DNA a little away from the centre of the palindrome sites, leaving single-stranded overhanging stretches called:

A) Blunt ends

B) Sticky ends

C) Satellite ends

D) Primer ends

100.

The cutting of DNA by restriction endonucleases results in fragments of DNA, which can be separated by a technique known as:

A) Polymerase Chain Reaction (PCR)

B) Gel Electrophoresis

C) Centrifugation

D) Western Blotting

101.

During gel electrophoresis, DNA fragments move towards which electrode, and why?

- | | |
|--|--|
| A) Cathode, because DNA is positively charged | B) Anode, because DNA is negatively charged due to phosphate groups |
| C) Cathode, because DNA is negatively charged | D) Anode, because DNA is positively charged due to histones |

102.

In agarose gel electrophoresis, DNA fragments separate according to their size due to the:

- | | |
|---|---|
| A) Differential charging of the fragments | B) Sieving effect provided by the agarose gel matrix |
| C) Chemical reaction between agarose and nitrogenous bases | D) Volatility of the smaller DNA segments |

103.

If a mixture of DNA fragments of sizes 2 kb, 5 kb, 7 kb, and 10 kb are separated on an agarose gel, which fragment will be found farthest from the loading wells?

- | | |
|-----------------|----------------|
| A) 10 kb | B) 7 kb |
| C) 5 kb | D) 2 kb |

104.

Separated DNA fragments on an agarose gel can be visualized only after staining them with a compound followed by exposure to radiation. Identify the compound and radiation:

- | | |
|--|---|
| A) Methylene blue, Visible light | B) Ethidium bromide, Infrared rays |
| C) Ethidium bromide, UV radiation | D) Bromophenol blue, X-rays |

105.

The process by which separated bands of DNA are cut out from the agarose gel and extracted from the gel piece is known as:

- | | |
|--------------------|--------------------------|
| A) Elution | B) Transformation |
| C) Sparging | D) Annealing |

106.

HindIII always cuts DNA molecules at a particular point by recognizing a specific sequence of:

- | | |
|------------------------|-------------------------|
| A) 4 base pairs | B) 6 base pairs |
| C) 8 base pairs | D) 10 base pairs |

107.

Choose the statement that correctly differentiates an exonuclease from an endonuclease:

- | | |
|---|---|
| A) Exonucleases make cuts at specific positions within the DNA. | B) Endonucleases remove nucleotides from the terminal ends of the DNA. |
| C) Exonucleases remove nucleotides from the ends of the DNA, whereas endonucleases make cuts at internal specific positions. | D) Endonucleases function only on single-stranded RNA. |

108.

The palindromic nucleotide sequence in DNA is a sequence of base pairs that reads the same on the two strands when:

- | | |
|--|---|
| A) Read from the centre to both ends | B) The orientation of reading is kept the same (e.g., 5' → 3') |
| C) One strand is read 5' → 3' and the other is read 3' → 5' in the same spatial direction | D) Read randomly by changing directions |

109.

Which of the following represents the exact palindromic sequence recognized by EcoRI?

- | | |
|---|---|
| A) 5' – GGATCC – 3' / 3' – CCTAGG – 5' | B) 5' – GAATTC – 3' / 3' – CTTAAG – 5' |
| C) 5' – AAGCTT – 3' / 3' – TTCGAA – 5' | D) 5' – GATATC – 3' / 3' – CTATAG – 5' |

110.

In genetic engineering, when creating a recombinant DNA molecule, it is essential to cut both the vector DNA and the source (foreign) DNA with the same restriction enzyme. Why?

- | | |
|---|---|
| A) To reduce the time required for incubation | B) So that the resulting DNA fragments have the same complementary sticky ends |
| C) To ensure that DNA polymerase can synthesize new strands smoothly | D) To keep the size of the vector and foreign DNA identical |

111.

Purified DNA ultimately precipitates out of the treated solution after the addition of:

- | | |
|--------------------------------|------------------------------------|
| A) Warm methanol | B) Chilled ethanol |
| C) Ice-cold Isopropanol | D) Room-temperature acetone |

112.

The process of removing the precipitated fine threads of DNA out of the suspension using a glass rod or loop is technically known as:

- | | |
|--------------------------|--------------------------|
| A) Elution | B) Spooling |
| C) Transformation | D) Centrifugation |

113.

Read the following statements carefully: Statement I: Other molecules like RNA, proteins, polysaccharides, and lipids can be removed by appropriate enzyme treatments during DNA purification. Statement II: Treatment of the cell lysate with Deoxyribonuclease is an essential step to isolate pure DNA for recombinant DNA technology. Choose the correct option:

- | | |
|--|--|
| A) Statement I is correct, Statement II is incorrect. | B) Statement I is incorrect, Statement II is correct. |
| C) Both statements are correct. | D) Both statements are incorrect. |

114.

PCR stands for Polymerase Chain Reaction. In this reaction, multiple copies of the gene (or DNA) of interest are synthesized in vitro using:

- A) A single set of primers and RNA polymerase
 B) Two sets of primers and DNA polymerase
 C) Two sets of primers and RNA primase
 D) A single set of primers and restriction enzymes

115.

The correct sequential steps involved in a single cycle of Polymerase Chain Reaction (PCR) are:

- A) Extension → Denaturation → Annealing
 B) Annealing → Extension → Denaturation
 C) Denaturation → Annealing → Extension
 D) Denaturation → Extension → Annealing

116.

If a PCR reaction is allowed to proceed efficiently for 30 cycles, the sample gene of interest can be amplified approximately:

- A) 1 thousand times
 B) 1 million times
 C) 1 billion times
 D) 1 trillion times

117.

Consider the following two statements regarding PCR: Statement I: The high temperature required for the denaturation step of PCR causes the separation of the two complementary strands of DNA by breaking hydrogen bonds. Statement II: Primers used in PCR are small, chemically synthesized oligonucleotides that are complementary to the regions of the template DNA. In the light of the above statements, choose the correct option:

- A) Both Statement I and Statement II are correct.
 B) Both Statement I and Statement II are incorrect.
 C) Statement I is correct but Statement II is incorrect.
 D) Statement I is incorrect but Statement II is correct.

118.

Read the following statements regarding the enzymes used in PCR: Statement I: Ordinary human DNA polymerase can be efficiently used in a standard thermal cycler machine for PCR execution. Statement II: Taq polymerase is a thermostable enzyme that remains active even during the high-temperature induced denaturation of double-stranded DNA.

Choose the correct option:

- A) Statement I is correct, Statement II is incorrect.
 B) Statement I is incorrect, Statement II is correct.
 C) Both statements are correct.
 D) Both statements are incorrect.

119.

Match Column I (PCR Step) with Column II (Primary Event/Temperature context):

Column I	Column II
A. Denaturation	(i) Thermostable Taq polymerase extends the primers using dNTPs
B. Annealing	(ii) Application of high heat to separate double-stranded DNA
C. Extension	(iii) Two sets of primers bind to their complementary regions on single strands

- A) A-(ii), B-(i), C-(iii)
 B) A-(ii), B-(iii), C-(i)
 C) A-(iii), B-(ii), C-(i)
 D) A-(i), B-(iii), C-(ii)

120.

Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R): Assertion (A): If the enzyme Taq polymerase is omitted from the PCR reaction tube, the extension phase fails to occur. Reason (R): Taq polymerase acts as the primer that provides the initial 3'-OH group required to begin strand separation. In the light of the above statements, choose the correct Answer:

- A) Both (A) and (R) are true.
 B) Both (A) and (R) are false.
 C) (A) is true but (R) is false
 D) (A) is false but (R) is true

121.

Restriction endonucleases cleave a DNA molecule by hydrolysing which type of bonds?

- A) Hydrogen bonds
 B) Phosphodiester bonds
 C) Glycosidic bonds
 D) Peptide bonds

122.

In the term "restriction enzyme", the word 'restriction' refers to its natural biological role in bacteria, which is:

- A) Restricting the size of the bacterial cell wall during division
 B) Restricting and preventing the replication of invading bacteriophages
 C) Restricting the transcription of host bacterial genes
 D) Restricting the rate of DNA replication in plasmids

123.

If a piece of foreign DNA is transferred into a host organism without being integrated into the host's chromosome, what will be its fate?

- A) It will replicate independently alongside the host genome.
 B) It will fail to replicate and will eventually be diluted out during cell division.
 C) It will automatically turn into a circular plasmid.
 D) It will integrate randomly into the mitochondrial DNA.

124.

In an agarose gel electrophoresis setup, if you forget to add Ethidium Bromide to the gel or loading dye, what will be the result?

- A) The DNA fragments will not move toward the anode.
 B) The DNA fragments will separate but remain completely invisible under UV light.
 C) The DNA will move in the reverse direction toward the cathode.
 D) The DNA strands will permanently denature.

125.

Consider the following statements regarding restriction endonucleases: Statement I: Each restriction nuclease functions by inspecting the length of a DNA sequence. Statement II: Exonucleases remove nucleotides from the ends of the DNA, whereas endonucleases make cuts at specific positions within the DNA. Statement III: The first restriction endonuclease to be isolated and characterised was EcoRI. Which of the statements given above are CORRECT?

- A) Only I and II B) Only II and III
C) Only I and III D) All I, II, and III

126.

Assertion (A): A restriction endonuclease cuts the DNA strands a little away from the centre of the palindrome sites. Reason (R): It cuts the same two bases on both the opposite strands of the double helix.

- 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.

127.

Consider the following statements regarding the steps of PCR and select the CORRECT option: Statement I: Denaturation is carried out at high temperatures (~94°C–96°C) to break the hydrogen bonds between double-stranded DNA. Statement II: Primers anneal to the 5' ends of the template DNA strands. Statement III: Deoxynucleotides (dNTPs) are added by Taq polymerase during the extension step in the 5' → 3' direction.

- A) Only I and II are correct B) Only II and III are correct
C) Only I and III are correct D) All I, II, and III are correct

128.

Assertion (A): In PCR, the annealing step requires a lower temperature (around 50°C–65°C) than the denaturation step. Reason (R): Lowering the temperature allows hydrogen bonds to form between the single-stranded DNA templates and the synthetic primers.

- 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.

129.

If you begin a PCR reaction with exactly 4 double-stranded DNA templates, how many total double-stranded DNA molecules will be present after completing exactly 5 cycles?

- A) 20 B) 32
C) 64 D) 128

130.

In the history of genetic engineering, the specific antibiotic resistance gene used by Cohen and Boyer to construct the first recombinant DNA molecule was isolated from which pathogenic bacterium?

- A) Escherichia coli B) Salmonella typhimurium
C) Agrobacterium tumefaciens D) Thermus aquaticus

131.

While designing a protocol for the isolation of genomic DNA from a filamentous fungal specimen like *Aspergillus niger*, which enzyme must be introduced first to breach the structural barrier of the cell wall?

- A) Lysozyme B) Cellulase
C) Chitinase D) Protease

132.

What is the fundamental functional reason why DNA fragments migrate towards the positive electrode (anode) during agarose gel electrophoresis?

- A) The nitrogenous purine bases impart a strong, net positive charge. B) The repetitive phosphate groups in the sugar-phosphate backbone confer a uniform net negative charge.
C) The ethidium bromide intercalator adds heavy negative ions to the DNA matrix. D) The ribose sugars oxidize rapidly under the high-voltage electrical field.

133.

In agarose gel electrophoresis, the separation of DNA fragments is primarily based on their:

- A) Charge-to-mass ratio B) Total net charge alone
C) Size or molecular weight D) Shape and configuration alone

134.

A student ran an agarose gel and loaded four DNA fragments of sizes 500 bp, 2 kb, 5 kb, and 10 kb. Which fragment will be found closest to the loading wells?

- A) 500 bp B) 2 kb
C) 5 kb D) 10 kb

135.

Under UV illumination, the Ethidium bromide-stained DNA fragments appear as:

- A) Bright blue bands B) Dark black shadows
C) Bright orange bands D) Green luminescent bands

Zoology

136.

Which of the following indicates pregnancy?

- A) Lack of menstruation. B) Occurrence of menstrual flow.
C) When released ovum is not fertilized. D) When Graafian follicle matures and endometrium regenerates through proliferation.

137.

When semen is released by the penis into the vagina during copulation, then it is called ____.

- A) ovulation
- B) insemination
- C) menstruation
- D) gametogenesis

138.

At the time of implantation, the human embryo is called ____.

- A) zygote
- B) blastocysts
- C) embryo
- D) foetus

139.

Fusion of haploid nucleus of sperm and that of ovum lead to the formation of ____.

- A) zygote
- B) blastocysts
- C) embryo
- D) foetus

140.

Which of the following differentiate into embryo?

- A) Morula
- B) Zygote
- C) Trophoblast
- D) Inner cell mass

141.

Trophoblast and inner cell mass are the arrangements of blastomeres as outer and inner layers respectively in ____.

- A) zygote
- B) morula
- C) placenta
- D) blastocysts

142.

The embryo with 8 to 16 blastomeres is called ____.

- A) zygote
- B) morula
- C) placenta
- D) blastocysts

143.

Presence of XX or XY chromosomes in zygote depends on

- A) the sperm carrying X chromosome fertilized the ovum.
- B) the sperm carrying Y chromosome fertilized the ovum.
- C) the sperm without any chromosome fertilized the ovum.
- D) the sperm carrying X or Y chromosomes fertilized the ovum.

144.

Which layer of blastocysts gets attached to the endometrium?

- A) Trophoblast
- B) Inner cell mass
- C) Umbilical cord
- D) Both (a) and (c)

145.

Finger like projection, called chorionic villi, appear on the ____ after the implantation.

- A) ampulla
- B) trophoblast
- C) infundibulum
- D) inner cell mass

146.

Which of the following hormones is produced in women only during pregnancy?

- A) Relaxin
- B) Estrogen
- C) Oxytocin
- D) Progesterone

147.

The placenta is formed from the ____ of the embryo and the ____ of the mother.

- A) uterus, trophoblast
- B) chorion, endometrium
- C) endometrium, chorion
- D) inner cell mass, endometrium

148.

Primary germ layers are

- A) ectoderm and inner cell mass only.
- B) trophoblast, ectoderm and mesoderm.
- C) endoderm and mesoderm only.
- D) ectoderm, endoderm and mesoderm.

149.

Which of the following hormone acts on uterine muscle and causes its stronger contraction?

- A) Relaxin
- B) Estrogen
- C) Oxytocin
- D) Progesterone

150.

Colostrum

- A) is a hormone essential for milk secretion.
- B) can be synthesized by the newborn infant but not by a foetus.
- C) stimulates further secretion of oxytocin for uterine contraction.
- D) is a source of antibodies essential to develop resistance against diseases in new born babies.

151.

Secretion of milk from the mammary gland towards the end of the pregnancy is called ____.

- A) lactation
- B) parturition
- C) fertilization
- D) implantation

152.

Which of the following process induces the completion of the meiotic division of secondary oocyte?

- A) Parturition
- B) Implantation
- C) Fertilization
- D) Gametogenesis

153.

By the end of how many weeks, major organ system are formed during the embryonic development?

- A) 4 weeks
- B) 8 weeks
- C) 12 weeks
- D) 24 weeks

154.

Which of the following induces foetal ejection reflex?

- A) Initiation of lactation
- B) Fully developed foetus and placenta
- C) Expulsion of the baby out of the uterus.
- D) Transport of embryo in the fallopian tube.

155.

Blastomeres are daughter cells formed in the process of

- A) cleavage, when zygote undergoes mitotic division. B) fertilization, when sperm enters in the cytoplasm of ovum.
- C) implantation, when blastocysts attached to the uterine endometrium. D) gametogenesis, when male and female gametes are produced by testis and ovary respectively

156.

Which of the following is required for the increased production of estrogen, progesterones, cortisol, prolactin and thyroxine etc. in the maternal blood? (i) Metabolic changes in the mother. (ii) Maintenance of pregnancy. (iii) Supporting the foetal growth (iv) Destruction of Graafian follicle

- A) (iii) and (iv) B) (i), (iv) and (v)
- C) (i), (ii) and (iii) D) All the four statements.

157.

Read the following statements (i to v) and answer the question. (i) It produces several hormones like hCG, hPL, estrogens, progesterones etc. (ii) It differentiates into three embryonic membranes – ectoderm, endoderm and mesoderm. (iii) It undergoes mitotic division. (iv) It is the organ, formed in the lining of the uterus by the union of the uterine mucous membrane with the membranes of the foetus. (v) It develops at a point of implantation and providing oxygen and nutrients for the foetus and transfer of waste products from the foetal to the maternal blood circulation. Identify the correct characteristics feature regarding placenta from the above statements.

- A) (iii) and (v) B) (i), (iv) and (v)
- C) (i), (ii) and (iv) D) all the four statements.

158.

Which of the following statements regarding parturition is incorrect?

- A) Prolactin induces uterine contraction. B) It is induced by neuroendocrine mechanism.
- C) Uterine contraction leads to expulsion of baby through the birth canal. D) Oxytocin plays an important role in the contraction of fallopian tube.

159.

In the given columns, column-I contain features of developing child and column-II contain the time of their occurrence. Select the correct match.

Column-I (Features of developing child)	Column-II (Time of there occurrence)
A. Heart sound	I. By the end of the second month of pregnancy
B. Foetus develops limbs and digit	II. During the fifth month
C. Formation of major organ system	III. First sign of growing foetus
D. First movement of foetus and appearance of hair on head	IV. By the end of 12 weeks
E. Body covered with hair, eyelid separate, eyelashes are formed	V. By the end of 24 weeks

- A) A-I; B-II; C-III; D-IV; E-V B) A-III; B-I; C-IV; D-II; E-V
- C) A-II; B-I; C-III; D-V; E-IV D) A-III; B-IV; C-II; D-V; E-I

160.

Match the column-I with column-II and select the correct option.

Column-I	Column-II
A Fertilization	I. Mitotic division
B Implantation	II. Embryo with 8 to 16 blastomeres
C Cleavage	III. Ampullary-isthmic junction
D Morula	IV. Structure formed by the continuous division of 8 to 16 blastomeres
E Blastocysts	V. Embedding of blastocysts in the endometrium

- A) A-I; B-II; C-IV; D-V; E-III B) A-III; B-I; C-IV; D-II; E-V
- C) A-III; B-V; C-I; D-IV; E-II D) A-III; B-V; C-I; D-II; E-IV

161.

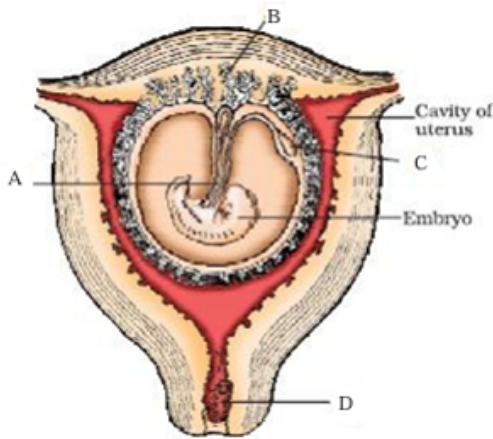
Select the correct match of terms given in column-I with their definition given in column-II.

Column-I (Terms)	Column-II (Definition)
A. Parturition	I. Duration between pregnancy (of about 9 month) and birth
B. Ovulation	II. Attachment of zygote to the endometrium
C. Gestation	III. Childbirth
D. Implantation	IV. Stoppage of menstruation
E. Conception	V. Release of egg from Graafian follicle
	VI. Process of milk secretion
	VII. Formation of zygote by fusion of the egg and sperm

- A) A-I; B-II; C-VII; D-V; E-III B) A-III; B-I; C-IV; D-II; E-V
- C) A-III; B-V; C-I; D-II; E-VI D) A-III; B-V; C-I; D-IV; E-II

162.

The given figure shows the human foetus within the uterus with few structures marked as A, B, C and D.

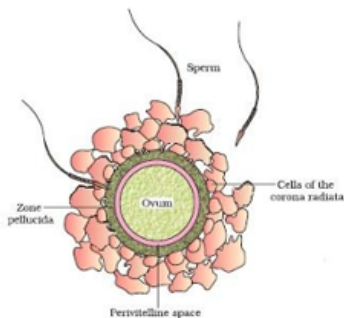


Which of the following options shows the correct labeling?

- A) A → Umbilical cord with its veins, B → Chorionic villi, C → Antrum, D → Plug of mucus in cervix
 B) A → Umbilical cord with its vessels, B → Fimbriae, C → Oocyte, D → Plug of mucus in vagina
 C) A → Umbilical cord with its vessels, B → Placental villi, C → Yolk sac, D → Plug of mucus in cervix
 D) A → Umbilical cord with veins, B → Placental villi, C → Trophoblast, D → Plug of mucus in vagina

163.

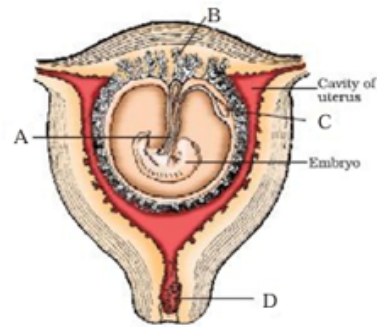
Study the given figure and conclude the correct explanation from the options given below:



- A) All the sperm attaches with ovum.
 B) Transport of sperm towards the ovum.
 C) Ovum and surrounded sperms were going to take part in fertilization.
 D) Sperm induces changes in the cells of corona radiata and blocks the entry of other additional sperms.

164.

The given figure shows the human foetus within the uterus. Identify the marked label (A to D) through which placenta is connected to the embryo.



- A) A
 B) B
 C) C
 D) D

165.

The given figure represent a stage of embryonic development. Identify the stage with its feature.



- A) Blastocysts, ready to fertilize with sperm.
 B) Secondary oocyte, implants on endometrial layer of uterus.
 C) Morula, formed by mitotic division of zygote.
 D) Ovary, produce female gamete and secretes hormones like estrogen etc.

166.

Fertilization can only occurs if

- A) sperm reaches the ampullary – isthmic junction before the ovum.
 B) ovum reaches the ampullary – isthmic junction before the sperm.
 C) sperms are transported to the uterus and ovum to the fallopian tube simultaneously.
 D) sperm and ovum are transported simultaneously to the ampullary – isthmic junction.

167.

Which of the following does not occur in the time during and immediately following fertilization?

- A) Fusion of the sperm and ovum nuclei.
 B) Division of the oocyte cell by meiosis
 C) Implantation of the ovum in the uterus.
 D) Digestion of cell layers around the oocyte by sperm.

168.

During human fertilisation, several events occur in a definite sequence after the sperm reaches the ovum. Which of the following combinations correctly represents the sequence of events?

- | | |
|---|---|
| <p>A) Sperm binding to zona pellucida → acrosomal reaction → entry of sperm → cortical reaction → completion of meiosis II → formation of male and female pronuclei</p> <p>C) Sperm entry → acrosomal reaction → completion of meiosis II → zona pellucida formation → implantation</p> | <p>B) Acrosomal reaction → completion of meiosis II → sperm binding to zona pellucida → cortical reaction → pronuclear fusion</p> <p>D) Zona pellucida dissolution → sperm entry → implantation → completion of meiosis II → cleavage</p> |
|---|---|

169.

A secondary oocyte released during ovulation remains surrounded by cells and is capable of being fertilised for a limited period. Which statement most appropriately explains the site and condition under which fertilisation normally occurs in humans?

- | | |
|--|--|
| <p>A) Fertilisation occurs in the uterus immediately after implantation of the blastocyst.</p> <p>C) Fertilisation occurs in the cervix because sperm acquire complete fertilising capacity there.</p> | <p>B) Fertilisation normally occurs at the ampullary-isthmic junction of the fallopian tube when viable sperm and the secondary oocyte are transported to this region.</p> <p>D) Fertilisation normally occurs in the vagina before sperm enter the female reproductive tract.</p> |
|--|--|

170.

Consider the following statements regarding the events immediately following fertilisation: 1.The secondary oocyte completes meiosis II after sperm entry. 2.A haploid female gamete and a second polar body are formed. 3.The sperm head enlarges to form the male pronucleus. 4.Fusion of male and female pronuclei results in formation of the diploid zygote. 5.The zygote immediately implants into the uterine wall. Which of the above statements are correct?

- | | |
|--|--|
| <p>A) 1, 2, 3 and 4 only</p> <p>C) 2, 4 and 5 only</p> | <p>B) 1, 3 and 5 only</p> <p>D) 1, 2, 3, 4 and 5</p> |
|--|--|

171.

The zygote formed following fertilisation undergoes repeated mitotic divisions without a corresponding increase in the overall size of the embryo. As it moves through the fallopian tube, the cells become progressively arranged into different stages before the embryo reaches the uterus. Which sequence correctly represents this early development?

- | | |
|--|--|
| <p>A) Zygote → morula → blastocyst → implantation</p> <p>C) Zygote → gastrula → morula → blastocyst → implantation</p> | <p>B) Zygote → blastocyst → morula → implantation</p> <p>D) Zygote → embryo → foetus → morula → implantation</p> |
|--|--|

172.

A blastocyst reaches the uterus and becomes closely associated with the endometrial lining. Which option correctly identifies the structures involved in implantation and their subsequent significance?

- | | |
|--|---|
| <p>A) Trophoblast forms the inner cell mass, while inner cell mass attaches directly to the endometrium.</p> <p>C) Inner cell mass forms the placenta exclusively, while trophoblast develops into the embryo.</p> | <p>B) Trophoblast becomes attached to the endometrium and contributes to the formation of the placenta, while the inner cell mass gives rise to the embryo.</p> <p>D) Zona pellucida remains intact throughout implantation and develops into the placenta.</p> |
|--|---|

173.

After implantation, the developing embryo undergoes differentiation and establishes a connection with the mother through a specialised structure. Which combination correctly describes the major functions of the placenta?

- | | |
|--|--|
| <p>A) Digestion of maternal food, production of sperm and exchange of gases</p> <p>C) Production of ova, storage of urine and secretion of digestive enzymes</p> | <p>B) Supply of nutrients and oxygen to the embryo, removal of carbon dioxide and excretory wastes, and endocrine function</p> <p>D) Prevention of all maternal substances from reaching the embryo and production of red blood cells only</p> |
|--|--|

174.

The placenta acts as an endocrine tissue during pregnancy. Which of the following combinations contains only hormones mentioned by NCERT as being secreted by the placenta?

- | | |
|---|---|
| <p>A) hCG, hPL, oestrogens and progesterogens</p> <p>C) TSH, ACTH, FSH and LH</p> | <p>B) FSH, LH, ADH and oxytocin</p> <p>D) Growth hormone, thyroxine, insulin and glucagon</p> |
|---|---|

175.

During pregnancy, several changes occur in the maternal reproductive system and endocrine environment. Which statement is most appropriate according to NCERT?

- | | |
|--|--|
| <p>A) hCG is secreted by the anterior pituitary and directly stimulates milk secretion throughout pregnancy.</p> <p>C) The placenta gradually becomes an important endocrine tissue and produces hormones that support pregnancy and foetal development.</p> | <p>B) The corpus luteum degenerates immediately after fertilisation, resulting in loss of progesterone.</p> <p>D) FSH and LH remain at high levels throughout pregnancy to stimulate repeated ovulation.</p> |
|--|--|

176.

Consider the following developmental events:

1. Formation of morula 2. Formation of blastocyst
3. Implantation 4. Formation of three germ layers
5. Development of organ systems Which sequence represents the correct general progression of human embryonic development?

- A) 1 → 2 → 3 → 4 → 5 B) 2 → 1 → 3 → 5 → 4
C) 3 → 1 → 2 → 4 → 5 D) 1 → 3 → 2 → 4 → 5

177.

The inner cell mass of the blastocyst undergoes extensive differentiation during embryonic development. Which statement correctly relates embryonic development to the germ layers?

- A) All tissues and organs develop directly from the trophoblast without involvement of germ layers. B) The embryo develops through differentiation of cells into germ layers, which subsequently contribute to the formation of different tissues and organs.
C) Only the ectoderm participates in organ formation, while mesoderm and endoderm disappear. D) Germ layers are formed only after birth during postnatal development.

178.

A pregnant woman undergoes ultrasonography during different stages of pregnancy. The developmental features observed would change considerably with advancing gestation. Which statement best reflects the sequence described in NCERT?

- A) Major organ systems begin to develop during embryonic development, while the developing organism subsequently undergoes growth and maturation during the foetal period. B) Organ formation occurs only after birth because the foetal period involves no structural development.
C) The embryo becomes a zygote again during the second trimester before developing into a foetus. D) Implantation occurs after complete development of all major organs.

179.

Which of the following statements about pregnancy and foetal development is incorrect?

- A) The placenta provides a functional connection between the developing foetus and the mother. B) The placenta has an important endocrine role during pregnancy.
C) The umbilical cord establishes a connection between the foetus and placenta. D) The placenta prevents all exchange of substances between maternal and foetal blood, thereby completely isolating the foetus from the maternal environment.

180.

Parturition is a complex neuroendocrine process involving signals from the fully developed foetus and maternal tissues. Which sequence most appropriately represents the mechanism described in NCERT?

- A) Foetal signals → mild uterine contractions → oxytocin release → stronger uterine contractions → further oxytocin release → expulsion of the baby B) Prolactin release → ovulation → uterine relaxation → oxytocin inhibition → delivery
C) FSH release → cervical closure → uterine relaxation → delivery D) hCG release → immediate uterine contraction → implantation → delivery

ANSWER KEY

Physics

1.	1	13.	3	25.	1	37.	2
2.	1	14.	4	26.	4	38.	3
3.	2	15.	1	27.	3	39.	3
4.	3	16.	2	28.	3	40.	3
5.	2	17.	1	29.	1	41.	3
6.	2	18.	2	30.	1	42.	3
7.	1	19.	2	31.	1	43.	2
8.	2	20.	2	32.	1	44.	3
9.	1	21.	3	33.	2	45.	3
10.	2	22.	1	34.	1		
11.	1	23.	1	35.	1		
12.	2	24.	3	36.	2		

Chemistry

46.	3	58.	2	70.	4	82.	3
47.	4	59.	3	71.	3	83.	1
48.	4	60.	4	72.	1	84.	2
49.	4	61.	3	73.	3	85.	2
50.	4	62.	2	74.	1	86.	3
51.	3	63.	3	75.	4	87.	1
52.	1	64.	2	76.	4	88.	4
53.	2	65.	2	77.	1	89.	1
54.	1	66.	1	78.	2	90.	3
55.	1	67.	4	79.	3		
56.	3	68.	4	80.	1		
57.	2	69.	1	81.	2		

Botany

91.	2	103.	4	115.	3	127.	3
92.	3	104.	3	116.	3	128.	1
93.	2	105.	1	117.	1	129.	4
94.	4	106.	2	118.	2	130.	2
95.	2	107.	3	119.	2	131.	3
96.	1	108.	2	120.	3	132.	2
97.	3	109.	2	121.	2	133.	3
98.	2	110.	2	122.	2	134.	4
99.	2	111.	2	123.	2	135.	3
100.	2	112.	2	124.	2		
101.	2	113.	1	125.	1		
102.	2	114.	2	126.	2		

Zoology

136.	1	139.	1	142.	2	145.	2
137.	2	140.	4	143.	4	146.	1
138.	2	141.	4	144.	1	147.	2

148.	4	157.	2	166.	4	175.	3
149.	3	158.	1	167.	3	176.	1
150.	4	159.	2	168.	1	177.	2
151.	1	160.	4	169.	2	178.	1
152.	3	161.	3	170.	1	179.	4
153.	3	162.	3	171.	1	180.	1
154.	2	163.	3	172.	2		
155.	1	164.	1	173.	2		
156.	3	165.	3	174.	1		

SOLUTIONS

Q1.

Answer: A

Explanation:

The time constant τ of an L - R circuit is given by $\tau = \frac{L}{R}$. Substituting $L = 10 \text{ mH}$ and $R = 2 \Omega$, we find $\tau = 5 \text{ ms}$. The growth of current with time is governed by $I(t) = I_0(1 - e^{-t/\tau})$, where the maximum steady-state current is $I_0 = \frac{E}{R} = 3 \text{ A}$. Evaluating at $t = 5 \text{ ms} = \tau$, we get $I = 3(1 - e^{-1}) \approx 1.89 \text{ A}$.

Q2.

Answer: A

Explanation:

The instantaneous current during decay in an L - R circuit is given by $i(t) = i_0 e^{-Rt/L}$. The total initial stored magnetic energy in the inductor is $E_0 = \frac{1}{2} Li_0^2$. The heat energy dissipated in the resistor from time $t = 0$ to t is equal to the decrease in the stored magnetic energy of the inductor: $H(t) = E_0 - E(t) = \frac{1}{2} Li_0^2 - \frac{1}{2} Li(t)^2$. Setting $H(t) = \frac{3}{4} E_0$ gives $\frac{1}{2} Li_0^2 (1 - e^{-2Rt/L}) = \frac{3}{4} (\frac{1}{2} Li_0^2)$, which simplifies to $e^{-2Rt/L} = \frac{1}{4}$, yielding $t = \frac{L}{R} \ln 2$.

Q3.

Answer: B

Explanation:

The growth of current in a series L - R circuit is governed by Kirchhoff's voltage law: $V - L \frac{di}{dt} - iR = 0$. Rearranging and integrating this differential equation with respect to time from 0 to t gives the total charge flown $Q = \int_0^t i dt$. By separating variables and integrating the terms, we find $Vt - Li = QR$, which simplifies to $Q = \frac{Vt - Li}{R}$.

Q4.

Answer: C

Explanation:

Applying Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) to the individual loops yields a coupled set of differential equations for the branch currents. Solving for the current i through the inductor branch as a function of time leads to an exponential growth equation with an equivalent time constant of $\tau = \frac{2L}{3R}$ and a steady-state current limit of $\frac{2\varepsilon}{3R}$, resulting in $i = \frac{2\varepsilon}{3R} (1 - e^{-\frac{3Rt}{2L}})$.

Q5.

Answer: B

Explanation:

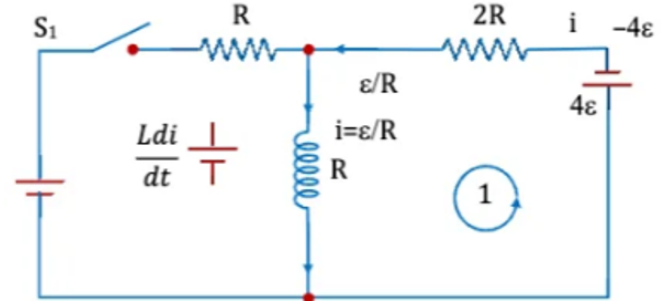
The time constant τ of an L - R circuit determines how rapidly the current approaches its maximum steady-state value. A larger time constant means the circuit takes a longer time to grow and reach equilibrium, resulting in a more gradual slope and a flatter curve, which corresponds to Curve 2.

Q6.

Answer: B

Explanation:

Before S_2 is closed and S_1 is closed, current in the left part of the circuit is $\frac{\varepsilon}{R}$. Now when S_2 is closed and S_1 is opened, current through the inductor cannot change suddenly, current $\frac{\varepsilon}{R}$ will continue to move in the inductor. Applying KVL in the loop gives the rate of change of current as $\frac{5\varepsilon}{L}$.



Q7.

Answer: A

Explanation:

At $t = 0$, current cannot change instantaneously through the inductor, so $i_3 = 0$. Using Kirchhoff's current and voltage laws, the current splits equally through the two branches, giving $i_1 = i_2 = \frac{\varepsilon}{2R}$ and $\frac{di_3}{dt} = \frac{\varepsilon}{L}$. At $t = \infty$, the inductor acts as a short circuit with zero potential difference, making $i_2 = 0$ and $i_1 = i_3 = \frac{\varepsilon}{2R}$.

Q8.

Answer: B

Explanation:

The time constant τ of an LR circuit is defined as the ratio of the inductance L to the total equivalent resistance R_{eq} connected across the inductor in steady state with the voltage source shorted: $\tau = \frac{L}{R_{eq}}$. Substituting the given values $L = 12 \text{ H}$ and $R_{eq} = 12 \Omega$: $\tau = \frac{12 \text{ H}}{12 \Omega} = 1 \text{ s}$.

Q9.

Answer: A

Explanation:

Immediately after the switch is closed, the inductor opposes any sudden change in current, acting as an open circuit (so current $i_3 = 0$). The resistors R_1 and R_2 are in series with the battery in the primary loop. The equivalent resistance is:

$$R_{eq} = R_1 + R_2 = 2 \Omega + 4 \Omega = 6 \Omega$$

The initial currents are:

$$i_1 = i_2 = \frac{E}{R_{eq}} = \frac{12 \text{ V}}{6 \Omega} = 2.0 \text{ amp}$$

Q10.

Answer: B

Explanation:

Substitute the fundamental dimensions of each quantity:

Inductance $[L] = [ML^2T^{-2}A^{-2}]$, Capacitance $[C] = [M^{-1}L^{-2}T^4A^2]$, Voltage $[V] = [ML^2T^{-3}A^{-1}]$,

Resistance $[R] = [ML^2T^{-3}A^{-2}]$ Numerator:

$[L^2] = [M^2L^4T^{-4}A^{-4}]$ Denominator:

$[CVR] = [M^{-1}L^{-2}T^4A^2] \times [ML^2T^{-3}A^{-1}] \times [ML^2T^{-3}A^{-2}] = [ML^2T^{-6}A^{-1}]$

Resulting dimension: $\left[\frac{L^2}{CVR}\right] = \frac{[M^2L^4T^{-4}A^{-4}]}{[ML^2T^{-6}A^{-1}]} = [ML^2T^2A^{-3}]$

the simpler combination $\frac{L}{CVR}$ which has dimension $[A^{-1}]$. Thus, for $\frac{L^2}{CVR}$, the dimension becomes current squared $[A^2]$.

Q11.

Answer: A

Explanation:

The maximum steady-state current I_0 is given by:

$I_0 = \frac{V}{R} = \frac{10\text{ V}}{5\ \Omega} = 2.0\text{ A}$ The time constant τ of the circuit is:

$\tau = \frac{L}{R} = \frac{10 \times 10^{-3}\text{ H}}{5\ \Omega} = 2.0\text{ ms}$ Using the current growth equation

in an LR circuit, $I = I_0(1 - e^{-t/\tau})$, we substitute $I = 1.0\text{ A}$:

$1.0 = 2.0(1 - e^{-t/\tau}) \implies e^{-t/\tau} = 0.5$ Taking the natural

logarithm on both sides:

$-\frac{t}{\tau} = \ln(0.5) \implies t = -\tau \ln(0.5) = -(2.0\text{ ms})(-0.693) = 1.39\text{ ms}$

Q12.

Answer: B

Explanation:

The rate of change of current in an LR circuit connected to an emf

E is given by: $\frac{dI}{dt} = \frac{E}{L} e^{-t/\tau}$ where the time constant is

$\tau = \frac{L}{R} = \frac{4 \times 10^{-3}}{12} = \frac{1}{3} \times 10^{-3}\text{ s}$. Substituting

$t = 0.001\text{ s} = 10^{-3}\text{ s}$, the exponent is: $-\frac{t}{\tau} = -\frac{10^{-3}}{\frac{1}{3} \times 10^{-3}} = -3$

Thus: $\frac{dI}{dt} = \frac{6}{4 \times 10^{-3}} \times e^{-3} = 1500 \times 0.05 = 75\text{ amp/sec}$.

Q13.

Answer: C

Explanation:

The growth of current in an LR circuit is governed by the differential equation: $L \frac{dI}{dt} + IR = E$ At the initial instant ($t = 0$), the current in the circuit is zero ($I = 0$), which simplifies the equation to:

$L \frac{dI}{dt} = E$ Substituting the given values $E = 20\text{ V}$ and $L = 10\text{ H}$:

$\frac{dI}{dt} = \frac{E}{L} = \frac{20\text{ V}}{10\text{ H}} = 2.0\text{ amp/s}$

Q14.

Answer: D

Explanation:

The growth of current in an $L - R$ circuit is given by the relation:

$I = I_0(1 - e^{-t/\tau})$ When the current reaches 95% of its maximum value ($I = 0.95I_0$), we substitute this into the equation:

$0.95I_0 = I_0(1 - e^{-t/\tau}) e^{-t/\tau} = 1 - 0.95 = 0.05$ Taking the natural logarithm on both sides:

$-\frac{t}{\tau} = \ln(0.05) \implies t = -\tau \ln(0.05)$

Q15.

Answer: A

Explanation:

The time constant τ of an $L - R$ series circuit is given by the

formula: $\tau = \frac{L}{R}$ Substituting the given values

$L = 15\text{ mH} = 15 \times 10^{-3}\text{ H}$ and $R = 3\ \Omega$:

$\tau = \frac{15 \times 10^{-3}\text{ H}}{3\ \Omega} = 5 \times 10^{-3}\text{ s} = 5\text{ ms}$

Q16.

Answer: B

Explanation:

The maximum steady-state current I_0 is given by:

$I_0 = \frac{V}{R} = \frac{10\text{ V}}{2.5\ \Omega} = 4\text{ A}$ The time constant τ of the circuit is:

$\tau = \frac{L}{R} = \frac{5\text{ H}}{2.5\ \Omega} = 2\text{ s}$ Using the current growth equation

$I = I_0(1 - e^{-t/\tau})$, at $t = 2\text{ s}$ ($\tau = 2\text{ s}$):

$I = 4(1 - e^{-2/2}) = 4(1 - e^{-1})\text{ A}$

Q17.

Answer: A

Explanation:

The dimensional formulas for the fundamental electrical quantities

are: Resistance (R): $[ML^2T^{-3}A^{-2}]$ Capacitance (C):

$[M^{-1}L^{-2}T^4A^2]$ Inductance (L): $[ML^2T^{-2}A^{-2}]$ Multiplying the dimensions of resistance and capacitance gives:

$[RC] = [ML^2T^{-3}A^{-2}] \times [M^{-1}L^{-2}T^4A^2] = [T]$ Thus, the

product RC has the dimensions of time (seconds), whereas $\frac{R}{L}$ and

$\frac{1}{\sqrt{LC}}$ have the dimensions of frequency ($[T^{-1}]$), and $\frac{C}{L}$ has dimensions of $[T^{-2}]$.

Q18.

Answer: B

Explanation:

The dimensional formulas for the fundamental electrical

components are: Resistance (R): $[ML^2T^{-3}A^{-2}]$ Inductance (L):

$[ML^2T^{-2}A^{-2}]$ Capacitance (C): $[M^{-1}L^{-2}T^4A^2]$ The ratio $\frac{R}{L}$

yields: $\left[\frac{R}{L}\right] = \frac{[ML^2T^{-3}A^{-2}]}{[ML^2T^{-2}A^{-2}]} = [T^{-1}]$ Since frequency has the

dimensions of inverse time ($[T^{-1}]$), the combination $\frac{R}{L}$ has the

dimensions of frequency, whereas RC has the dimensions of time ($[T]$) and $\frac{1}{\sqrt{LC}}$ or other incorrect options scale differently.

Q19.

Answer: B

Explanation:

To find the potential difference $V_A - V_B$, we apply Kirchhoff's

Voltage Law (KVL) while traversing the circuit from point A to point B . Across a resistor, the potential drops in the direction of current

by $I R$. Across an inductor with a current increasing at rate $\frac{di}{dt}$, the

induced back-EMF creates a potential drop equal to $L \frac{di}{dt}$. When

moving from the negative to the positive terminal of a battery, the

potential increases by its EMF, and vice versa.

Q20.

Answer: B

Explanation:

To find the potential difference $V_A - V_B$, we apply Kirchhoff's Voltage Law (KVL) by traversing the circuit sequentially from point A to point B . The potential changes across each component are accounted for in the direction of the current flow: Across a resistor, the potential decreases by IR . Across an inductor with a current changing at $\frac{di}{dt}$, the induced back-EMF creates a potential drop equal to $L\frac{di}{dt}$. Moving across a battery from the positive to the negative terminal causes a potential drop, and vice versa.

Q21.

Answer: C

Explanation:

To find the potential difference $V_A - V_B$, we apply Kirchhoff's Voltage Law (KVL) starting from point A and moving towards point B . The potential drop across a resistor is $-IR$, across a cell from positive to negative terminal is $-E$, and across an inductor in the direction of increasing current is $-L\frac{di}{dt}$. Following the path from A to B : $V_A - I(5) - 10 - I(5) - L\frac{di}{dt} = V_B$. Substituting the given values ($I = 4$ A, $\frac{di}{dt} = 2$ A/s, and $L = 5$ H):
 $V_A - (4)(5) - 10 - (4)(5) - (5)(2) = V_B$
 $V_A - 20 - 10 - 20 - 10 = V_B$
 $V_A - V_B = 60$ V

Q22.

Answer: A

Explanation:

Apply Kirchhoff's Voltage Law (KVL) from point A to point B . First, find the rate of change of current $\frac{di}{dt}$ by differentiating the given current equation with respect to time t . Substitute $t = 3$ s to find $\frac{di}{dt}$ and I at that instant, then set up the KVL equation $V_A - I(R_1) - L\frac{di}{dt} - I(R_2) = V_B$ to solve for $V_A - V_B$.

Q23.

Answer: A

Explanation:

Resistor voltage $V_R = IR = (4)(2) = 8$ V Inductor voltage $V_L = L\frac{di}{dt} = (0.01)(500) = 5$ V Add the voltage changes from (A) to (B) $V_A - V_B = V_R + V_L = 8 + 5 = 13$ V Match with the options $V_A - V_B = 13$ V

Q24.

Answer: C

Explanation:

For a solenoid, $L = \mu_0 n^2 Al$. Since the turn density n and cross-sectional area A remain constant, $L \propto l$. The length is doubled, so $L_2 = 2L_1 = 2(4) = 8$ H

Q25.

Answer: A

Explanation:

Since the current is decreasing at the rate of 5×10^2 A/s, the rate of change of current is $\frac{di}{dt} = -5 \times 10^2$ A/s. Applying Kirchhoff's Voltage Law (KVL) from point A to point B , we write:

$V_A - iR - E - L\frac{di}{dt} = V_B$ Substituting the given values:

$$V_A - (4)(1)(2) - 10 - (10 \times 10^{-3})(-5 \times 10^2) = V_B$$

$$\Rightarrow V_A - (4)(2) - 10 - (10 \times 10^{-3})(-5 \times 10^2) = V_B$$

$$V_A - 8 - 10 - (0.01)(-500) = V_B$$

$$V_A - 18 + 5 = V_B \Rightarrow V_A - V_B = 13$$
 V

Q26.

Answer: D

Explanation:

The magnetic flux linkage of a coil is related to its inductance L and current I by the formula $N\Phi = LI$. Substituting the given values of inductance $L = 3$ H and current $I = 4.5$ A, we find the total magnetic flux linkage: $N\Phi = 3 \times 4.5 = 13.5$ Wb.

Q27.

Answer: C

Explanation:

The formula for the self-inductance of a solenoid is $L = \mu_0 n^2 Al$. Since the turn density n remains constant, the self-inductance depends on the cross-sectional area A and the length l . The area A scales with the square of the linear dimensions ($A \propto x^2$), and the length l scales linearly ($l \propto x$). Therefore, $L \propto A \cdot l \propto x^3$. When all linear dimensions are increased by a factor of 2 ($x = 2$), the self-inductance increases by a factor of $2^3 = 8$.

Q28.

Answer: C

Explanation:

The formula for the self-inductance of a solenoid is $L = \mu_0 n^2 Al$. Since the turn density n and the cross-sectional area A remain constant, the self-inductance L is directly proportional to the length l . Therefore, when the length is tripled ($l_2 = 3l_1$), the new self-inductance becomes $L_2 = 3L_1 = 3 \times 3 = 9$ H.

Q29.

Answer: A

Explanation:

Given the self-inductance $L = 3$ mH and current $I = t^3 e^{-2t}$. Differentiating the current with respect to time using the product rule gives

$$\frac{dI}{dt} = \frac{d}{dt}(t^3 e^{-2t}) = t^3(-2e^{-2t}) + e^{-2t}(3t^2) = e^{-2t}(3t^2 - 2t^3) = t^2 e^{-2t}$$

. For the induced emf to be zero, $E = -L\frac{dI}{dt} = 0$, which means $\frac{dI}{dt} = 0$. Since $t^2 e^{-2t} \neq 0$ for non-zero time, we set $3 - 2t = 0$, yielding $t = 1.5$ sec.

Q30.

Answer: A

Explanation:

The induced emf is given by $E = -L\frac{dI}{dt}$, which becomes zero when $\frac{dI}{dt} = 0$. Using the product rule to differentiate the current $I = t^2 e^{-3t}$ with respect to time t , we get $\frac{dI}{dt} = 2te^{-3t} - 3t^2 e^{-3t} = te^{-3t}(2 - 3t)$. Setting this derivative to zero for non-zero time yields $2 - 3t = 0$, leading to $t = \frac{2}{3}$ sec.

Q31.

Answer: A

Explanation:

The induced emf is given by $E = -L \frac{dI}{dt}$. Substituting the inductance $L = 3 \text{ H}$, initial current $I_1 = 4 \text{ A}$, final current $I_2 = -4 \text{ A}$, and time interval $\Delta t = 2 \text{ sec}$, we get $E = -3 \times \left(\frac{-4-4}{2}\right) = -3 \times (-4) = 12 \text{ V}$ with magnitude, but following the convention representing opposition: $E = -12 \text{ V}$.

Q32.

Answer: A

Explanation:

The magnitude of the induced electromotive force in a self-inductance coil is given by $|E| = L \left| \frac{di}{dt} \right|$. Substituting the given values where $L = 4 \text{ H}$, initial current $i_1 = 2 \text{ A}$, final current $i_2 = 6 \text{ A}$, and time interval $\Delta t = 2 \text{ sec}$, we get $|E| = 4 \times \left(\frac{6-2}{2}\right) = 4 \times 2 = 8 \text{ V}$.

Q33.

Answer: B

Explanation:

The magnitude of the induced emf in a solenoid is given by $|E| = L \frac{di}{dt} = \left(\frac{\mu_0 N^2 A}{l}\right) \frac{di}{dt}$. Substituting the given values where $\mu_0 = 4\pi \times 10^{-7} \text{ H/m}$, $N = 300$, $A = \pi(0.01)^2 \text{ m}^2$, $l = 0.2 \text{ m}$, and $\frac{di}{dt} = 0.5 \text{ A/s}$, we get $|E| = \frac{4\pi \times 10^{-7} \times (300)^2 \times \pi \times (0.01)^2}{0.2} \times 0.5 \approx 1.78 \times 10^{-4} \text{ V}$.

Q34.

Answer: A

Explanation:

For a toroid with mean radius R , the magnetic field inside the core at distance R is given by $B = \frac{\mu_0 NI}{2\pi R}$. The total flux linkage is $N\Phi = N(B \cdot A) = \frac{\mu_0 N^2 IA}{2\pi R}$. Using the definition of self-inductance $L = \frac{N\Phi}{I}$, we get $L = \frac{\mu_0 N^2 A}{2\pi R}$.

Q35.

Answer: A

Explanation:

The magnetic field at the center of a circular coil of N turns and radius R carrying current I is given by $B = \frac{\mu_0 NI}{2R}$. The total magnetic flux linkage is $N\Phi = N(B \cdot A) = N\left(\frac{\mu_0 NI}{2R}\right)(\pi R^2) = \frac{\mu_0 N^2 I \pi R}{2}$. Using the definition of self-inductance $L = \frac{N\Phi}{I}$, we get $L = \frac{\mu_0 N^2 \pi R}{2}$.

Q36.

Answer: B

Explanation:

The total potential difference is the sum of the voltage drops across the resistors, the cell, and the inductor.

$$V_A - V_B = IR_1 + \mathcal{E} + IR_2 + L \frac{di}{dt} \\ V_A - V_B = (3)(5) + 10 + (3)(5) + (10)(2) = 15 + 10 + 15 + 20 = 60 \text{ V}$$

Q37.

Answer: B

Explanation:

Sum the potential drops across all components moving from A to B. $V_A - V_B = I(R_1 + R_2) + \mathcal{E} + L \frac{di}{dt}$ $V_A - V_B = 4(2 + 3) + 20 + 5(3) = 4(5) + 20 + 15 = 20 + 20 + 15$.

Q38.

Answer: C

Explanation:

The formula for self-inductance is $L = \mu_0 n^2 Al$. Since turn density (n) and area (A) are constant, L is directly proportional to length (l). If length is tripled ($l_2 = 3l_1$), the inductance triples ($L_2 = 3L_1$). $L_2 = 3 \times 3\text{H} = 9\text{H}$.

Q39.

Answer: C

Explanation:

The formula is $L = \mu_0 n^2 Al$. Area $A = \pi r^2$. If radius (r) is doubled, Area becomes 4 times larger ($2^2 = 4$). Since $L \propto A$, the inductance becomes 4 times larger. $L_2 = 4 \times 4\text{H} = 16\text{H}$.

Q40.

Answer: C

Explanation:

The magnetic flux (Φ) linked with a coil is the product of its self-inductance (L) and the current (I) flowing through it. $\Phi = L \times I$ $\Phi = 5 \text{ H} \times 3 \text{ A} = 15 \text{ Wb}$.

Q41.

Answer: C

Explanation:

Using the formula $\Phi = L \times I$, we multiply the inductance by the current. $\Phi = 4 \text{ H} \times 2.5 \text{ A} = 10 \text{ Wb}$.

Q42.

Answer: C

Explanation:

The self-inductance of a solenoid is given by $L = \mu_0 n^2 Al$. Since turn density (n) is constant, L is proportional to the product of Area (A) and length (l). If linear dimensions scale by 3, Area scales by $3^2 = 9$ and length scales by 3. Total factor is $9 \times 3 = 27$.

Q43.

Answer: B

Explanation:

The formula using total turns is $L = \frac{\mu_0 N^2 A}{l}$. Here N is constant. If linear dimensions double ($factor = 2$), Area quadruples ($2^2 = 4$) and length doubles (2). The ratio is $\frac{4}{2} = 2$.

Q44.

Answer: C

Explanation:

The self-inductance of a solenoid is given by $L = \mu_0 n^2 Al$. Since turn density (n) and area (A) are constant, L is directly proportional to length (l). If length is doubled ($l_2 = 2l_1$), the inductance doubles ($L_2 = 2L_1$). $L_2 = 2 \times 2\text{H} = 4\text{H}$.

Q45.

Answer: C

Explanation:

Using the formula $L = \mu_0 n^2 A l$, with n and A constant, L is directly proportional to l . If the length is tripled ($l_2 = 3l_1$), the inductance triples ($L_2 = 3L_1$). $L_2 = 3 \times 5\text{H} = 15\text{H}$.

Q46.

Answer: C

Explanation:

o-Xylene undergoes electrophilic aromatic substitution on the ring. The methyl groups are activating and ortho/para-directing, yielding a mixture of 4-bromo-1,2-dimethylbenzene (para to one methyl) and 3-bromo-1,2-dimethylbenzene (ortho to one methyl).

Q47.

Answer: D

Explanation:

Ozonolysis of a cyclic alkene cleaves the double bond to form a dicarbonyl compound. 1-Methylcyclobutene (a 4-membered ring with 1 methyl substituent on the double bond) yields the 5-carbon keto-aldehyde upon ring cleavage.

Q48.

Answer: D

Explanation:

The addition of HBr to an unsymmetrical alkene proceeds via the most stable carbocation. Protonation of 1-phenylpropene yields a highly resonance-stabilized benzylic carbocation, which is then attacked by Br^- to give $\text{C}_6\text{H}_5\text{CH}(\text{Br})\text{CH}_2\text{CH}_3$.

Q49.

Answer: D

Explanation:

Protonation of 3, 3-dimethylbut-1-ene generates a secondary carbocation. A 1, 2-methyl shift converts this into a much more stable tertiary carbocation, which deprotonates to yield the highly substituted, stable alkene 2, 3-dimethyl-2-butene.

Q50.

Answer: D

Explanation:

Catalytic oxidation of benzene over vanadium pentoxide (V_2O_5) at 773 K causes oxidative ring cleavage to yield maleic anhydride.

Q51.

Answer: C

Explanation:

Both methylenecyclohexane and 1-methylcyclohexene form the same highly stable tertiary carbocation (1-methylcyclohexyl cation) upon protonation, which then reacts with Cl^- to yield 1-chloro-1-methylcyclohexane.

Q52.

Answer: A

Explanation:

Deprotonation of terminal alkynes by NaNH_2 followed by alkylation with $\text{CH}_3\text{CH}_2\text{Br}$ sequentially lengthens the carbon chain. One alkylation gives 1-butyne, and a second alkylation gives 3-hexyne.

Q53.

Answer: B

Explanation:

Adding KHSO_4 introduces a high concentration of bisulfate ions (HSO_4^-), shifting the nitronium ion (NO_2^+) formation equilibrium backward via the common ion effect, thereby slowing down the reaction.

Q54.

Answer: A

Explanation:

Ketene ($\text{H}_2\text{C}=\text{C}=\text{O}$) contains only 2 carbons and cannot yield propene (a 3-carbon compound) via simple elimination or addition-elimination sequences.

Q55.

Answer: A

Explanation:

The strong acid HF protonates cyclohexene to form a cyclohexyl carbocation. This carbocation acts as an electrophile in a Friedel-Crafts alkylation reaction with benzene, yielding cyclohexylbenzene.

Q56.

Answer: C

Explanation:

Propene (C_3H_6) possesses allylic hydrogens which readily undergo free radical halogenation in the gas phase because the intermediate allylic free radical is stabilized by resonance.

Q57.

Answer: B

Explanation:

Vinyl halides (chloroethene) and aryl halides (chlorobenzene, bromobenzene) have partial double bond character in their C-X bonds due to resonance, making them inert to carbocation formation. Isopropyl chloride readily dissociates to form a stable tertiary/secondary carbocation.

Q58.

Answer: B

Explanation:

Pyrrole is an electron-rich heteroaromatic ring. Delocalization of the nitrogen lone pair creates greater partial negative charge at C-2 and C-5, making them the most reactive toward electrophiles.

Q59.

Answer: C

Explanation:

Hydration of propyne via Markovnikov's rule yields an enol intermediate (prop-1-en-2-ol), which immediately tautomerizes to the highly stable ketone, acetone.

Q60.

Answer: D

Explanation:

Methane (CH_4) undergoes bromination to form methyl bromide (CH_3Br). Wurtz coupling of methyl bromide yields ethane ($\text{CH}_3\text{-CH}_3$), which contains 2 carbons (less than 4).

Q61.

Answer: C

Explanation:

The nitro group ($-\text{NO}_2$) is strongly electron-withdrawing via inductive ($-I$) and resonance ($-M$) effects. Thus, it destabilizes any adjacent carbocation on the ring, making the unsubstituted cyclohexadienyl carbocation the most stable.

Q62.

Answer: B

Explanation:

Lindlar's catalyst (H_2 , Pd/ CaCO_3 poisoned with quinoline) performs selective syn-addition of hydrogen to alkynes, yielding cis-alkenes.

Q63.

Answer: C

Explanation:

Ozonolysis products (propanone and ethanal) reconstruct alkene "A" as 2-methylbut-2-ene. Addition of HCl to 2-methylbut-2-ene yields 2-chloro-2-methylbutane via the more stable tertiary carbocation.

Q64.

Answer: B

Explanation:

Benzene reacts with Cl_2 in the presence of AlCl_3 to undergo electrophilic aromatic substitution, replacing a ring hydrogen with a chlorine atom.

Q65.

Answer: B

Explanation:

Neopentane (2, 2-dimethylpropane) contains 12 equivalent primary hydrogens. Substitution of any hydrogen yields the identical mono-chlorinated product, neopentyl chloride.

Q66.

Answer: A

Explanation:

Cyclic trimerization of propyne over a red-hot iron tube at 873 K yields mesitylene (1, 3, 5-trimethylbenzene). Mesitylene (C_9H_{12}) contains a total of 21 σ bonds.

Q67.

Answer: D

Explanation:

The Wurtz reaction is highly effective for synthesizing symmetrical alkanes with an even number of carbon atoms. Unsymmetrical alkanes like n-heptane require a mixture of two different alkyl halides, resulting in a low yield due to the formation of multiple alkane products.

Q68.

Answer: D

Explanation:

Ozonolysis of terminal alkenes containing a $=\text{CH}_2$ group produces methanal (HCHO) as a product. Allylcyclohexane possesses a terminal double bond, so its cleavage yields methanal.

Q69.

Answer: A

Explanation:

Hydroboration-oxidation of 1-butene undergoes regioselective anti-Markovnikov hydration to yield the primary alcohol 1-butanol as the major product.

Q70.

Answer: D

Explanation:

The hydroxyl group ($-\text{OH}$) in phenol is a strongly activating ortho/para-director due to its powerful resonance electron donation ($+M$), making phenol highly reactive toward electrophiles.

Q71.

Answer: C

Explanation:

The halogenation of alkanes (such as methane with bromine under light) proceeds via a free radical chain substitution mechanism.

Q72.

Answer: A

Explanation:

Saytzeff's rule states that in dehydrohalogenation reactions, the major product is the more highly substituted (and more stable) alkene. Disubstituted pent-2-ene is preferred over monosubstituted pent-1-ene.

Q73.

Answer: C

Explanation:

Decarboxylation of sodium carboxylate salts is carried out by heating with soda lime, which is a mixture of NaOH and calcium oxide (CaO).

Q74.

Answer: A

Explanation:

In the presence of peroxides, the addition of HBr to an unsymmetrical alkene proceeds via a free radical anti-Markovnikov mechanism (Kharasch effect), placing the bromine atom on the less substituted terminal carbon.

Q75.

Answer: D

Explanation:

Chlorobenzene is prepared via electrophilic aromatic substitution by reacting benzene directly with chlorine gas in the presence of anhydrous Lewis acid catalysts like FeCl_3 .

Q76.

Answer: D

Explanation:

Ozonolysis of 3-methylbut-1-ene ($(\text{CH}_3)_2\text{CH}-\text{CH}=\text{CH}_2$) cleaves the terminal double bond, producing formaldehyde (HCHO) and 2-methylpropanal ($(\text{CH}_3)_2\text{CH}-\text{CHO}$).

Q77.

Answer: A

Explanation:

Heating sodium ethanoate (CH_3COONa) with soda lime (NaOH/CaO) yields methane gas (CH_4). The molar mass of methane is 16 g/mol, so 2 moles weigh 32 g.

Q78.

Answer: B

Explanation:

Converting a terminal double bond into a terminal aldehyde requires anti-Markovnikov hydration to form a primary alcohol first, followed by mild oxidation to an aldehyde using Pyridinium chlorochromate (PCC).

Q79.

Answer: C

Explanation:

2, 3-Dimethylbutane is $\text{CH}_3\text{-CH}(\text{CH}_3)\text{-CH}(\text{CH}_3)\text{-CH}_3$. This structure has exactly two tertiary carbon atoms (C-2 and C-3, which are each bonded to three other carbons) and has the formula C_6H_{14} .

Q80.

Answer: A

Explanation:

Both statements are correct. Branching makes molecules more compact and spherical, reducing contact surface area. This weakens van der Waals dispersion forces, lowering the boiling points of pentanes in the order n-pentane (309 K) > isopentane (301 K) > neopentane (282.5 K).

Q81.

Answer: B

Explanation:

Acidic potassium permanganate (KMnO_4/H^+) oxidatively cleaves terminal alkynes to yield carboxylic acids and carbon dioxide.

Q82.

Answer: C

Explanation:

Baeyer's reagent is chemically defined as a cold, dilute, alkaline or neutral aqueous solution of potassium permanganate (KMnO_4), which is used to test for unsaturation via syn-dihydroxylation.

Q83.

Answer: A

Explanation:

Direct fluorination of aromatic compounds with fluorine gas (F_2) is extremely exothermic and explosive, making it unsuitable for the direct synthesis of fluoroarenes.

Q84.

Answer: B

Explanation:

Alkanes with a tertiary C-H bond can be selectively oxidized to tertiary alcohols by KMnO_4 . Setting $\text{R}^1 = \text{R}^2 = \text{R}^3 = \text{CH}_3$ gives isobutane, which contains a tertiary hydrogen and gets oxidized to tert-butyl alcohol.

Q85.

Answer: B

Explanation:

Sodium in liquid ammonia ($\text{Na}/\text{liquid NH}_3$) reduces internal alkynes selectively to trans-alkenes via a free radical mechanism involving anti-addition of hydrogen.

Q86.

Answer: C

Explanation:

- Lindlar's catalyst is H_2 over Pd on CaCO_3 (q). - Birch catalyst is sodium in liquid ammonia (p). - Baeyer's reagent is dilute, cold KMnO_4 (s). - Kharasch effect is anti-Markovnikov addition of HBr in the presence of peroxides (r).

Q87.

Answer: A

Explanation:

Protonation of 4, 4-dimethylpent-2-ene forms a secondary carbocation adjacent to a quaternary carbon. A 1, 2-methyl shift occurs to form a more stable tertiary carbocation, which reacts with Cl^- to give 2-chloro-2,3-dimethylpentane.

Q88.

Answer: D

Explanation:

Bromination of vinylcyclopentane gives a vicinal dibromide (1, 2-dibromo-1-cyclopentylethane). Double dehydrohalogenation using hot alcoholic KOH eliminates two equivalents of HBr to form a terminal alkyne, cyclopentylacetylene.

Q89.

Answer: A

Explanation:

The addition of water across the double bond of 1-methylcyclohexene to form 2-methylcyclohexanol is an anti-Markovnikov syn-hydration. Hydroboration-oxidation using BH_3 , $\text{H}_2\text{O}_2/\text{OH}^-$ is the standard regioselective method to achieve this transformation.

Q90.

Answer: C

Explanation:

Acid-catalyzed hydration of propene gives propan-2-ol (product A), while hydroboration-oxidation yields propan-1-ol (product B). Since both products possess the same straight three-carbon chain, they do not show chain isomerism, making Statement C incorrect.

Q91.

Answer: B

Q92.

Answer: C

Q93.

Answer: B

Q94.

Answer: D

Q95.

Answer: B

Q96.

Answer: A

Q97.

Answer: C

Q98.

Answer: B

Q99.

Answer: B

Q100.

Answer: B

Q101.

Answer: B

Q102.

Answer: B

Q103.

Answer: D

Q104.

Answer: C

Q105.

Answer: A

Q106.

Answer: B

Q107.

Answer: C

Q108.

Answer: B

Q109.

Answer: B

Q110.

Answer: B

Q111.

Answer: B

Q112.

Answer: B

Q113.

Answer: A

Q114.

Answer: B

Q115.

Answer: C

Q116.

Answer: C

Q117.

Answer: A

Q118.

Answer: B

Q119.

Answer: B

Q120.

Answer: C

Q121.

Answer: B

Q122.

Answer: B

Q123.

Answer: B

Q124.

Answer: B

Q125.

Answer: A

Q126.

Answer: B

Q127.

Answer: C

Q128.

Answer: A

Q129.

Answer: D

Q130.

Answer: B

Q131.

Answer: C

Q132.

Answer: B

Q133.

Answer: C

Q134.

Answer: D

Q135.

Answer: C

Q136.

Answer: A

Q137.

Answer: B

Q138.

Answer: B

Q139.

Answer: A

Q140.

Answer: D

Q141.

Answer: D

Q142.

Answer: B

Q143.

Answer: D

Q144.

Answer: A

Q145.

Answer: B

Q146.

Answer: A

Q147.

Answer: B

Q148.

Answer: D

Q149.

Answer: C

Q150.

Answer: D

Q151.

Answer: A

Q152.

Answer: C

Q153.

Answer: C

Q154.

Answer: B

Q155.

Answer: A

Q156.

Answer: C

Q157.

Answer: B

Q158.

Answer: A

Q159.

Answer: B

Q160.

Answer: D

Q161.

Answer: C

Q162.

Answer: C

Q163.

Answer: C

Q164.

Answer: A

Q165.

Answer: C

Q166.

Answer: D

Q167.

Answer: C

Q168.

Answer: A

Q169.

Answer: B

Q170.

Answer: A

Q171.

Answer: A

Q172.

Answer: B

Q173.

Answer: B

Q174.

Answer: A

Q175.

Answer: C

Q176.

Answer: A

Q177.

Answer: B

Q178.

Answer: A

Q179.

Answer: D

Q180.

Answer: A