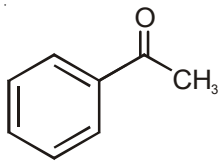
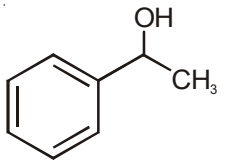
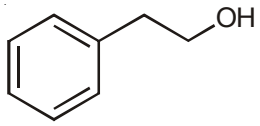
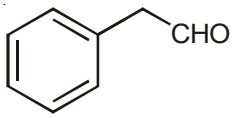
Choose the correct answer :

41. Compound X is

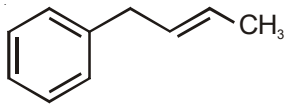
(A) 

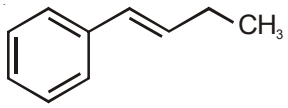
(B) 

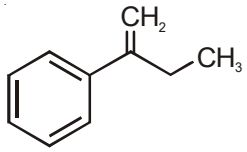
(C) 

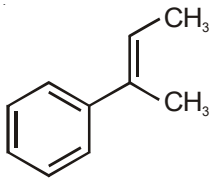
(D) 

42. The major compound Y is

(A) 

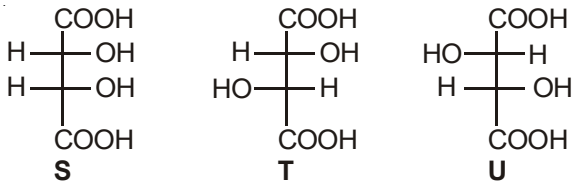
(B) 

(C) 

(D) 

Paragraph for Q. 43. & 44.

P and Q are isomers of dicarboxylic acid $C_4H_4O_4$. Both decolorize Br_2/H_2O. On heating, P forms the cyclic anhydride. Upon treatment with dilute alkaline $KMnO_4$, P as well as Q could produce one or more than one from S, T and U.

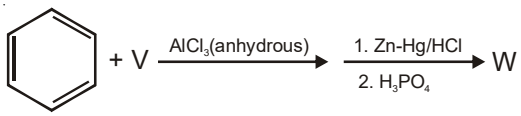


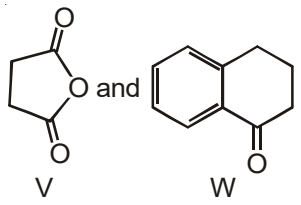
[JEE (Adv)-2013 (Paper-2)]

Choose the correct answer :

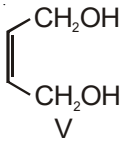
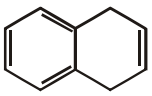
43. Compounds formed from P and Q are, respectively
    (A) Optically active S and optically active pair (T, U)
    (B) Optically inactive S and optically inactive pair (T, U)
    (C) Optically active pair (T, U) and optically active S
    (D) Optically inactive pair (T, U)) and optically inactive S

44. In the following reaction sequences V and W are respectively $Q \xrightarrow[\Delta]{H_2/Ni} V$

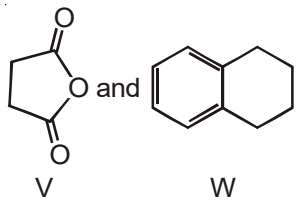


(A)  and

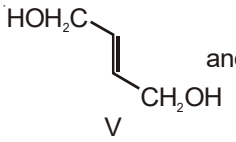
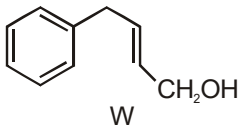
V W

(B)  and 

V W

(C)  and

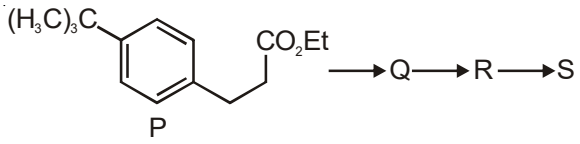
V W

(D)  and 

V W

Paragraph for Q. 45. & 46.

The reaction of compound **P** with CH_3MgBr (excess) in $(C_2H_5)_2O$ followed by addition of H_2O gives **Q**. The compound **Q** on treatment with H_2SO_4 at 0ºC gives **R**. The reaction of **R** with CH_3COCl in the presence of anhydrous $AlCl_3$ in CH_2Cl_2 followed by treatment with H_2O produces compound **S**. [Et in compound **P** is ethyl group]



P

[JEE (Adv)-2017 (Paper-2)]

Choose the correct answer :

45. The reactions, **Q** to **R** and **R** to **S**, are

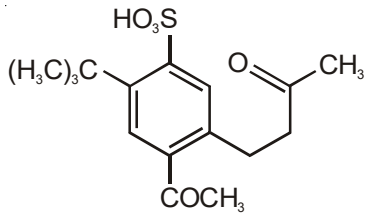
(A) Dehydration and Friedel-Crafts acylation

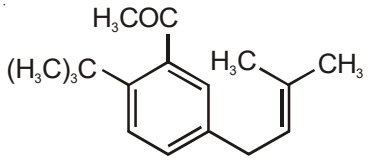
(B) Friedel-Crafts alkylation, dehydration and Friedel-Crafts acylation

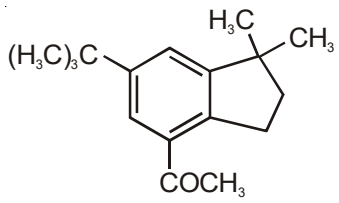
(C) Friedel-Crafts alkylation and Friedel-Crafts acylation

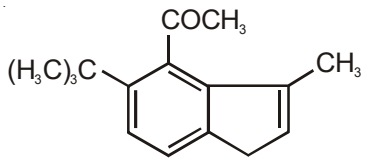
(D) Aromatic sulfonation and Friedel-Crafts acylation

46. The product **S** is

(A) 

(B) 

(C) 

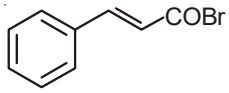
(D) 

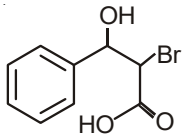
Paragraph for Q. 47. & 48.

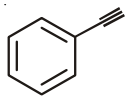
Treatment of benzene with CO/HCl in the presence of anhydrous $AlCl_3$/CuCl followed by reaction with Ac_2O/NaOAc gives compound X as the major product. Compound X upon reaction with Br_2/Na_2CO_3, followed by heating at 473 K with moist KOH furnishes Y as the major product. Reaction of X with H_2/Pd-C, followed by H_3PO_4 treatment gives Z as the major product. **[JEE (Adv)-2018 (Paper-1)]**

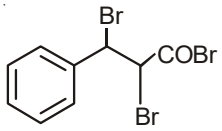
Choose the correct answer :

47. The compound Y is

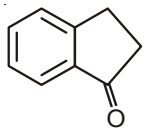
(A) 

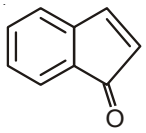
(B) 

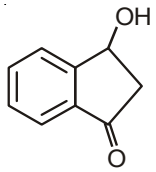
(C) 

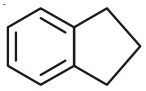
(D) 

48. The compound Z is

(A) 

(B) 

(C) 

(D) 

49. Match the entries in **Column I** with the correctly related quantum number(s) in **Column II**. Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix given in the ORS. **[IIT-JEE-2008 (Paper-2)]**

Column I	**Column II**
(A) Oribital angular momentum of the electron in a hydrogen-like atomic orbital	(p) Principal quantum number
(B) A hydrogen-like one-electron wave function obeying Pauli principle	(q) Azimuthal quantum number
(C) Shape, size and orientation of hydrogen-like atomic orbitals	(r) Magnetic quantum number
(D) Probability density of electron at the nucleus in hydrogen-like atom	(s) Electron spin quantum number

50. Dilution processes of different aqueous solutions, with water, are given in LIST-I. The effects of dilution of the solutions on $[H^+]$ are given in LIST-II. **[JEE (Adv)-2018 (Paper-2)]**

(Note: Degree of dissociation (α) of weak acid and weak base is << 1; degree of hydrolysis of salt <<1; $[H^+]$ represents the concentration of H^+ ions)

List-I	List-II
P. (10 mL of 0.1 M NaOH + 20 mL of 0.1 M acetic acid) diluted to 60 mL	1. the value of $[H^+]$ does not change on dilution
Q. (20 mL of 0.1 M NaOH + 20 mL of 0.1 M acetic acid) diluted to 80 mL	2. the value of $[H^+]$ changes to half of its initial value on dilution
R. (20 mL of 0.1 M HCl + 20 mL of 0.1 M ammonia solution) diluted to 80 mL	3. the value of $[H^+]$ changes to two times of its initial value on dilution
S. 10 mL saturated solution of $Ni(OH)_2$ in equilibrium with excess solid $Ni(OH)_2$ is diluted to 20 mL (solid $Ni(OH)_2$ is still present after dilution).	4. the value of $[H^+]$ changes to $\frac{1}{\sqrt{2}}$ times of its initial value on dilution
	5. the value of $[H^+]$ changes to $\sqrt{2}$ times of its initial value on dilution

Match each process given in LIST-I with one or more effect(s) in LIST-II. The correct option is

(A) P $\rightarrow$ 4; Q $\rightarrow$ 2; R $\rightarrow$ 3; S $\rightarrow$ 1

(B) P $\rightarrow$ 4; Q $\rightarrow$ 3; R $\rightarrow$ 2; S $\rightarrow$ 3

(C) P $\rightarrow$ 1; Q $\rightarrow$ 4; R $\rightarrow$ 5; S $\rightarrow$ 3

(D) P $\rightarrow$ 1; Q $\rightarrow$ 5; R $\rightarrow$ 4; S $\rightarrow$ 1