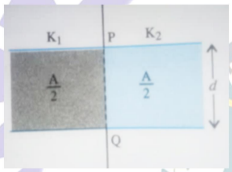
NEW STANDARD ACADEMY

Marks: 60

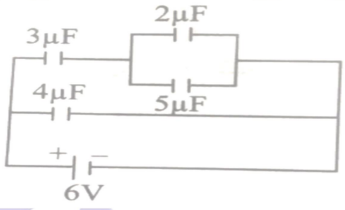
Date : 13-05-24 **CLASS : 12TH** **Time: 3 HRS**

PHYSICS

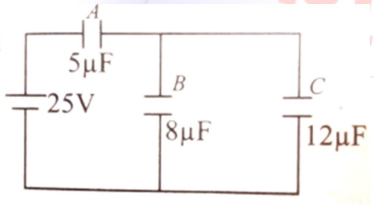
1. Given a number of capacitors labelled as 8 μF and 250V. Find the minimum number of capacitors needed to get an arrangement equivalent to 16 μF and 1000 V.
2. A 900 pF capacitor is charged by a 100 V battery. The electric energy stored by a capacitor is?
3. From the fig. Find the capacitance of the capacitor?



4. A circuit is shown in the figure below. Find out the charge of the condenser having capacity 5 μF.



5. Three capacitors 2,3 and 4 μF are connected in series with 6V battery . When the current stops, the charge on the 3 μF capacitor is ?
6. The diameter of the plate of a parallel plate condenser is 6cm. If its capacity is equal to a sphere of diameter 200 cm, the separation between the plates of the condenser is ?
7. Three capacitors A,B and C are connected to a battery of 25 volt as shown in the figure .The ratio of charges on capacitors A,B and C will be-



8. Aconductor of capacitance o.5μF has been charged to 100 volts. It is now connected to uncharged conductor of capacitance 0.2 μF. The loss in potential energy is nearly?
9. If potential (in volts) in a region is expressed as V (*x,y,z*) = *6xy-+y+2yz*, the electric field (in N/C) at point (1,1,0) is ?
10. A Capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. What is the effect on total electrostatic energy of system.

CHEMISTRY

11. Express the rate of following reactions
    a) $4PH_3(g) \longrightarrow P_{4(g)} + 6H_{2(g)}$
    b) $2NO_2 + F_2 \longrightarrow 2NO_2F + 2F$
    c) $5Br^- + BrO_3^- + 6H^+ \longrightarrow 3Br_2 + 3H_2O$
12. The following reaction was carried out in water

    $Cl_2 + 2I^- \longrightarrow I_2 + 2Cl^-$

    The initial concentration of I^- was 0.25 $molL^{-1}$ and the concentration after 10 minutes was 0.23 $molL^{-1}$ calculate the rate of disappearance of I^- and rate of appearance of I_2
13. Write the main factor's affecting the rate of a chemical reaction
14. In the following reaction, how is the rate of appearance of the underlined product related to the rate of disappearance of the underlined reaction?

    $BrO_3^-(aq) + \underline{5Br^-}(aq) + 6H^-(aq) \longrightarrow \underline{3Br_2(l)} + +3H_2O$
15. The reaction : $N_2O_5(g) \longrightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$. Takes place in a closed container. If during a certain time interval the rate of decomposition of N_2O_5 is 1.8×10^{-3} mol L^{-1} min-1, What will be rates of rates of formation of NO_2 and O_2 during the same interval.

16. A gaseous reaction ,$A_2(g) \longrightarrow B(g) + \frac{1}{2} c\ (g)$; Shows increase in pressure from 100 mm to 120 mm in 5 minutes.What is the rate of disappearanace of A_2.
17. For the reaction ,A $\longrightarrow$ B, $-\frac{d[A]}{dt} = \frac{2d[B]}{dt}$,then rate law is?
18. The rate of formation of NO(g) in the reaction,
$2\ NOBr(g) \longrightarrow 2NO(g)+Br_2(g)$
19. $2N_2O_5$ $4NO_2 + O_2$ is a gaseous reaction. It was found that the concentration of NO_2 increases by 4×10^{-2} Mol/L in 10 Second .Calculate the rate of reaction and the rate of change of concentration of N_2O_5.
20. Write the difference between molecularity and order of reaction.

BIOLOGY

21. Who give the DNA modal Explain it.
22. How many types of histone protein is present in nucleosome. Give its function.
23. What is N base give the difference between Purine and pyrimidine
24. Explain the mechanism of DNA replication in prokaryotes.
25. If E. coli was allowed to grow for 80 minutes then what would be the proportions of light and hybrid density in a DNA molecule?
26. If the length of E.coli DNA is 2.72mm, Can you calculate the number of base pair in E.coli?
27. A template strand is given below . Write dwon the corrispending coding strand and the mRNA strand that can be formed along with their polarity.
3-ATGCATGCATGCATGCATGC-5
28. State the dual role deoxy ribonucleoside tripophate during DNA replication.
29. What is transformation it proff by experiment.
30. How did Hershy and Chase differentiate between DNA and protein in their experiment while proving that DNA is the genetic material?

MATHS

21. Solve the following system of linear of linear equations , using matrix matrix method : x-y+z = 4; 2x+y-3z=0; x+y+z=2
22. If P is is non – singular matrix then value of adj (P^{-1}) in terms of P is
23. Let $A = \begin{bmatrix} -5 & -8 & -7 \\ 3 & 5 & 4 \\ 2 & 3 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} x \\ y \\ 2 \end{bmatrix}$. If AB is a scalar multiple of B,then the value of $x+y$ is
24. If A is an idempotent matrix and I is identity matrix of the same order such that $(A+I)^n = I + 127A$, then the value of n, $n \in N$, is
25. Let $A+2B = \begin{bmatrix} 1 & 2 & 0 \\ 6 & -3 & 3 \\ -5 & 3 & 1 \end{bmatrix}$ and 2A-B $= \begin{bmatrix} 2 & -1 & 5 \\ 2 & -1 & 6 \\ 0 & 1 & 2 \end{bmatrix}$ then Tr(A) – Tr(B) has the value equal to
26. If A and B are are two square matrices such that $B=A^{-1}BA$, then $(A+B)^2$ equals
27. If A is an 3× 3 non –singular matrix such that AA' =A'A and B =$A^{-1}A'$,then BB' equals
28. If $A = \begin{bmatrix} 5a & -b \\ 3 & 2 \end{bmatrix}$ and A adj A=AA^T, then 5a+b is equal to
29. If $A = \begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix}$, then adj $(3A^2+12A)$ is equal to
30. Let k be appositive real number and $A = \begin{bmatrix} 2k-1 & 2\sqrt{k} & 2\sqrt{k} \\ 2\sqrt{k} & 1 & -2k \\ -2\sqrt{k} & 2k & -1 \end{bmatrix}$ and B $= \begin{bmatrix} 0 & 2k-1 & \sqrt{k} \\ 1-2k & 0 & 2\sqrt{k} \\ -\sqrt{k} & -2\sqrt{k} & 0 \end{bmatrix}$. If det (adjA) +det (adjB) $=10^6$, then [k] is equal to.