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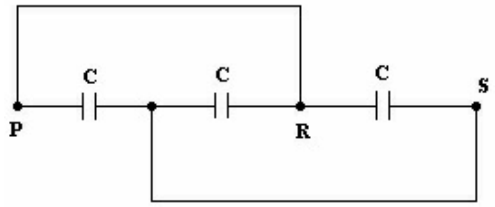
REVISON TEST -03 **Total Marks -30**

12th Physics -Electrostatic Potential & Capacitance

Multiple Choice Questions 5x1 =5

1. If the charge on a capacitor is increased by 2 coulomb, the energy stored in it increases by 21%. The original charge on the capacitor (in coulomb) is
   a. 30
   b. 20
   c. 40
   d. 40
   e. 10
2. A parallel plate capacitor of capacitance C is connected to a battery and is charged to a potential difference V. Another capacitor of capacitance 2C is similarly charged to a potential difference 2V. The charging battery is then disconnected and the capacitors are connected in parallel to each other in such a way that the positive terminal of one is connected to the negative terminal of the other. The final energy of the configuration is
   a. $\frac{25}{6}CV^2$
   b. $\frac{3}{2}CV^2$
   c. $\frac{9}{2}CV^2$
   d. zero
3. when two capacitors are put in series, the equivalent capacitance is
   a. the product of the capacitances
   b. the reciprocal of the capacitances
   c. smaller than both capacitances
   d. the sum of the capacitances
4. For a parallel plate capacitor _____possible potential difference between the capacitor plates
   a. dielectric decreases the minimum
   b. dielectric increases the minimum
   c. dielectric increases the maximum
   d. dielectric decreases the maximum
5. Three capacitors, each of capacitance C = 3 mF, are connected as shown in the figure.

The equivalent capacitance between points P and S is



a. $3\ \mu\text{F}$
b. $9\ \mu\text{F}$
c. $1\ \mu\text{F}$
d. $6\ \mu\text{F}$

Short Type 1 Questions 4 x2 =8

6. We know that electric field is discontinuous across the surface of a charged conductor. Is electric potential also discontinuous there?

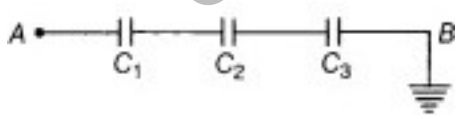
7. Name the physical quantity whose SI unit is JC^{-1}. Is it a scalar or a vector quantity?

8. Does the electric potential increase or decrease along the electric line of force?

9. What is the work done by the field of a nucleus in a complete circular orbit of the electron? What if the orbit is elliptical?

Short Type 2 Questions 3 x3 =9

10. Calculate the potential difference and the energy stored in the capacitor C_2 in the circuit shown in the figure. Given potential at A is 90 V, C_1 = 20 µF, C_2 = 30 µF and C_3 = 15µF.



11. A cube of side b has a charge q at each of its vertices. Determine the potential and electric field due to these charges array at the centre of the cube.

12. A cylindrical capacitor has two co-axial cylinders of length 15 cm and radii 1.5 cm and 1.4 cm. The outer cylinder in earthed and the inner cylinder is given a charge of $3.5\mu C$. Determine the capacitance of the system and the potential of the inner cylinder. Neglect end effects (i.e. bending of field lines at the ends).

Long Type Questions 2 x4 =8

13. A capacitor of unknown capacitance is connected across a battery of V volt. The charge stored in it is 360μC. When potential across the capacitor is reduced by 120 V, the charge stored in it becomes 120 μC. Calculate (i) the potential V and the unknown capacitance C. (ii) what will be the charge stored in the capacitor, if the voltage applied had increased by 120 V?

14. An electrical technician requires a capacitance of $2\mu F$ in a circuit across a potential difference of 1kV. A large number of $1\mu F$ capacitors are available to him each of which can withstand a potential difference of not more than 400 V. Suggest a possible arrangement that requires the minimum number of capacitors