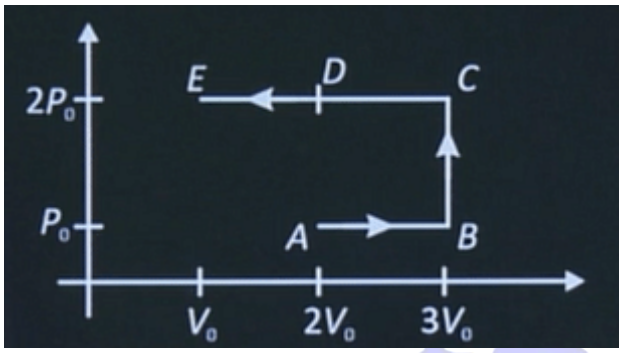
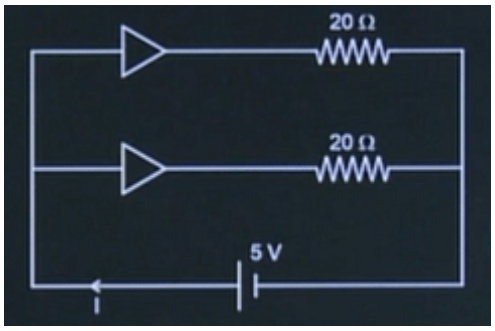
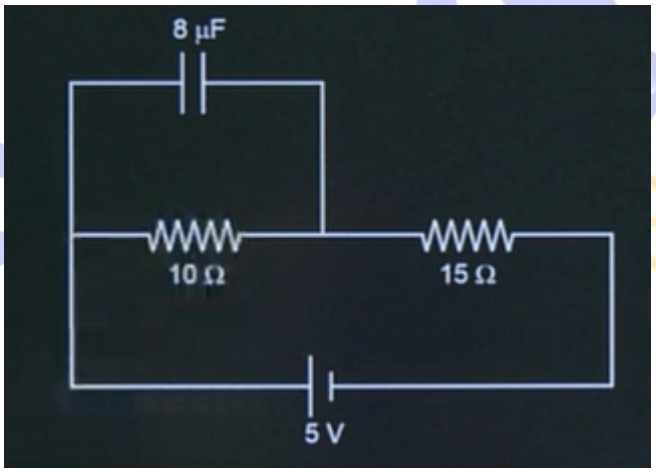
JEE Main 23 January 2025 Shift 2

Physics Question Paper with Answer Key

Q.No.	Questions	Answers
1	Find the total work done from A to E. 	$-3P_0V_0$
2	**Statement 1:** Graph of frequency f of X ray and atomic number Z of heavy nucleus is straight line, in X ray emission. **Statement 2:** Graph of square root of frequency $\sqrt{f}$ of X ray and atomic number Z of heavy nucleus is straight line, in X ray emission.	Statement 1 incorrect and Statement 2 is correct.
3	In a series LCR circuit, inductance L = 100 mH and capacitance C = 10 nF. The angular frequency of the source when current has maximum amplitude in the circuit is	10^5 rad/s
4	A satellite is nine times closer to earth compared to moon. Time period of moon is 27 days then period of satellite is	1 Day
5	Two charges +7 C and -4 C are located at (-7, 0, 0) and (7, 0, 0), find the electrostatic potential energy of the system. ($K = 1/4\pi\varepsilon_0 = 9 \times 10^9$ Sl units)	$-18 * 10^9$ J

6	Two ideal diodes are connected in circuit as shown. Find current through battery. 	0.5 A
7	In an electromagnetic wave of frequency 20 MHz, value of electric field is 9.3 V/m, then magnitude of magnetic field at that instant is	$3.1 * 10^{-8}$
8	A particle of mass m is projected at angle 60° with horizontal. If initial kinetic energy is $K\varepsilon_0$, and kinetic energy at maximum height is $K\varepsilon_0/x$ find value of x.	x = 4
9	The energy in a system varies with position and time as $E(x,t) = x^3e^{-\beta t}$, where $\beta = 0.3\ sec^{-1}$. Given that the P% error in x = 1.2% and that the % error in t = 1.6%, find the maximum % error in E at t = 5 sec.	6%
10	A concave mirror of focal length f dipped into a flued of refractive index μ. The new focal-length mirror is	f
11	Match the correct dimensions- (a) Magnetic Field - (i) ML^2 (b) Permittivity of free space - (ii) $M^{-1}L^{-3}T^4A^2$ (c) Moment of Inertia - (iii) $MT^{-2}A^{-1}$ (d) Velocity - (iv) LT^{-1}	(a)→(iii), (b)→(ii), (c)→(i), (d)→(iv)
12	The temperature of a body of mass m and specific heat capacity s is raised slowly from T_1 to T_2. The change is entropy of the system is	$ms\ ln(T_2/T_1)$
13	A moving coil galvanometer with coil resistance G = 30 Ω, shows full-scale deflection when the current through it is 20 mA. The galvanometer is converted to an ammeter of range 3 A by using a shunt, then resistance S is	0.2 Ω

14	Torque on a uniform disk of mass 2 kg, radius 1 m is given as ????(t) = $5t^2$ - 8t. If the disk was initially at rest, find power by torque at t = 1 s.	7 W
15	During charging of capacitor of 2.5 mF in DC circuit, the displacement current is found to be 0.25 mA then find rate of change of voltage V w.r.t. time dV/dt.	100 V/s
16	In a photoelectric experiment, the stopping potential of 2 V, the work function of metal is 2.14 eV. Find the wavelength of incident light (given hc = 1242 eV-nm)	300 nm
17	The equation of wave travelling in a medium is given by y(x, t) = 4.0 sin(20 × 10^{-3}x + 600t) mm. The velocity of wave is n x 10^4 m/s. Find n.	3
18	Find the charge on the capacitor (in µF) at steady state. 	16 mC
19	For a prism, the minimum deviation is equal to the angle of prism. If the refractive index is √3, find the minimum deviation (in degrees)	60^O
20	A satellite of mass m is moving in circular orbit at a height R from surface of Earth (mass M, radius R). If the angular momentum of the satellite is m√NGMR, find N.	N = 2