GANPAT UNIVERSITY U. V. PATEL COLLEGE OF ENGINEERING B.TECH. SEM-I

2ES103: BASIC OF ELECTRICAL ENGINEERING CH. 2 CAPACITOR 5: ASSIGNMENT &TUTORIAL

Part – I Multiple Objective Questions (MCQ)

8.85×10 ⁻¹² F/m. The charge on the capacitor is 100 V. The stored energy in capacitor is A) 8.85 pJ B) 440 pJ C) 22.1 nJ D) 44.3 nJ 2. The capacitance of a capacitor is not influenced by A) Plate thickness B) Plate area C) Plate separation D) Nature of dielectric 3. A capacitor carries a charge of 0.1 C at 5 V. Its capacitance is A) 0.02 F B) 0.5 F C) 0.05 F D) 0.2 F 4. A 10 μF, 20 μF, 22 μF, and 100 μF capacitor are in parallel. The total capacitance A) 2.43 μF B) 4.86 μF C) 100 μF D) 152 μF 5. Five capacitors each of 5 μF are connected in series, the equivalent capacitance of system will be A) 5 μF B) 25 μF C) 10 μF C) 10 μF D) 1 μF 6. To obtain a high value of capacitance, the permittivity of dielectric medium should be A) Low B) Zero C) High D) Unity 7. When the plate area of a capacitor increases, A) the capacitance increases B) the capacitance decreases C) the capacitance is unaffected D) The voltage it can withstand increases. 8. The energy stored in an electric field is given by the expression. A) 1/2 CV ² 2/2 2/2 2/2 2/2 2/2 2/2 2/2 2/2 2/2 2	1.	between	the electrodes. The dielectric be	etween th	f 100 mm2, with spacing of 0.1 mm e plates is air with a permittivity of	
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Part - II Shorts Questions

(1 & 2 Marks)

- 1. What is time constant? What is the unit of time constant?
- **2.** Define Following Terms:
 - (i) Electric Field
 - (ii) Electric Flux Density
 - (iii) Permittivity
 - (iv) Electric Field Intensity
 - (v) Potential Gradient
- **3.** Why series resistance is connected during charging and discharging?
- **4.** Only write the equation of capacitance of a parallel plate capacitor.
- **5.** Define a capacitance.

<u>Part – III Examples</u>

1. A capacitor is consisting of two circular plates each of 200 cm² area and separated by 1 mm thick dielectric. Its capacitance is of 4.5 X 10⁻⁴ μF. When a p.d. of 15 kV is applied, calculate the electric flux density and the dielectric constant.

Ans: D = 3.375 x
$$10^{-4}$$
 c/m², $\epsilon_r = 2.54$

2. Three capacitors of capacitances $10 \mu F$, $25 \mu F$ and $50 \mu F$ are connected (a) in series (b) in parallel. Find the equivalent capacitances and the energy stored for each of the cases, when p.d. 500 V is applied.

Ans:
$$C = 85 \mu F$$
, $W = 10.625 joules$

3. Capacitor of 50 μ F in series with 100 Ω resistor is suddenly connected across 100 V DC supply. Find (i) time constant of the circuit (ii) initial current (iii) current equation as a function of time (iv) voltage across resistor after 6ms.

Ans: (i)
$$\lambda = 5$$
ms (ii) $I_m = 1$ A (iii) $i = e^{-200t}$ A (iv) $V_R = 30.12$ V

4. A capacitor of 2 µF is charged through a resistor of 500k connected in series with it across a 500 V dc supply. Determine the voltage to which the capacitor is charged when the charging current has decreased to 80 % of its initial value.

Ans: V = 98.75 V

Part – III Long Questions

(Only For Preparation)

- **1.** Derive an expression for the energy stored in a capacitor of C farads when charged to a potential difference of V volts.
- 2. Explain multiplate capacitor.
- 3. Capacitance of parallel plate capacitor with composite medium.
- **4.** Derive equation for charging of capacitor in RC circuit. Also define time constant of circuit.

*Notes: Students have to write only Part I, Part II and Part III.