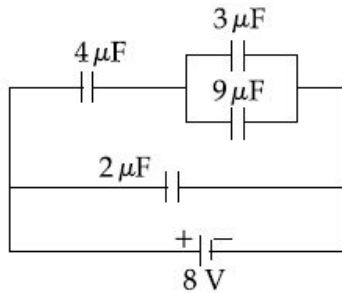


A combination of capacitors is set up as shown in the figure. The magnitude of the electric field, due to a point charge  $Q$  (having a charge equal to the sum of the charges on the  $4\ \mu\text{F}$  and  $9\ \mu\text{F}$  capacitors), at a point distant  $30\ \text{m}$  from it, would equal :



- (1)  $240\ \text{N/C}$
- (2)  $360\ \text{N/C}$
- (3)  $420\ \text{N/C}$
- (4)  $480\ \text{N/C}$

$$3\ \mu\text{F} \parallel 9\ \mu\text{F} = 12\ \mu\text{F}$$

$$4\ \mu\text{F} \text{ is series with } 12\ \mu\text{F} \text{ is equivalent to } \frac{4 \times 12}{4 + 12} \mu\text{F} = 3\ \mu\text{F}$$

$$Q_{3\ \mu\text{F}} = 3 \times 8 = 24\ \mu\text{C} = Q_{4\ \mu\text{F}} = Q_{12\ \mu\text{F}}$$

$$Q_{9\ \mu\text{F}} = \frac{9}{3+9} \times Q_{12\ \mu\text{F}} = 18\ \mu\text{C}$$

$$Q_{4\ \mu\text{F}} + Q_{9\ \mu\text{F}} = 24 + 18 = 42\ \mu\text{C}$$

$$E_{42\ \mu\text{C}} = 9 \times 10^9 \times \frac{42 \times 10^{-6}}{30^2} = 420\ \text{N/C}$$

Hence, Option (3).

Based on JEE Main 2016  
[123IITJEE.COM](http://123IITJEE.COM)