It is not departmental policy to provide complete specimen answers to past examination papers. However, to help you in revision, numerical values and similar information are given below so that you can check your attempts. If you have attempted past questions and wish to discuss the descriptive questions or the details of your calculations, please see me!

Dr Booth

Question 1

a) Field is 5.4×10^3 V m^{-1} at 207° anticlockwise from the x-axis.

b) Current 3.93 A; terminal voltage 11.8 V.

c) Combined capacitance 1.6 μF.

d) Proton speed 2.9×10^6 m s^{-1}.

f) Field is $E = \dfrac{Qd}{2\pi\varepsilon_0 a^3}$.

g) Position is at $x = 3\,L$.

Question 2

b) For $r > R$, $E = \dfrac{\rho_0 R^2}{3\varepsilon_0 r}$;

For $r < R$, $E = \dfrac{\rho_0 r^2}{3\varepsilon_0 R}$

d) E field has magnitude 930 V m^{-1} at an angle 65° below the negative x-axis.

Question 3

a)iv) Time is 115 s.

b)i) E field has magnitude 9.4×10^7 V m^{-1} directed towards the negative charge.

ii) Force on negative charge is 680 N, directed towards the mid-point of the line between the positive charges

Force on positive charges is 390 N, at 60° to both the extension of the line between the positive charges and the line to the negative charge.

iii) Total energy is –47 J.