Formula sheet

This formula sheet will be provided to candidates in the examination and may be used to answer any question.

$R_T = R_1 + R_2 + R_3$

$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

$V = IR$

$V_{out} = V_{in} \frac{R_2}{R_1 + R_2}$

$P = VI = \frac{V^2}{R} = I^2R$

$V_{rms} = \frac{V_{peak}}{\sqrt{2}}$

$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$

$C_T = C_1 + C_2 + C_3$

$C = \frac{kA}{d}$ where $k = \varepsilon_0 \varepsilon_r$

$L_T = L_1 + L_2 + L_3$

$\frac{1}{L_T} = \frac{1}{L_1} + \frac{1}{L_2}$

$X_L = 2\pi fL$

$Z = \sqrt{R^2 + X^2}$

$V_T = \sqrt{V_R{}^2 + V_C{}^2}$ (or $V_L{}^2$)

$X_C = \frac{1}{2\pi fC}$

$f = \frac{1}{2\pi\sqrt{LC}}$

$T = \frac{1}{f}$

$\tau = CR$

$Q = \frac{2\pi fL}{R}$ or $\frac{1}{2\pi fCR}$

$Q = \frac{f_C}{f_U - F_L} = \frac{\text{centre frequency}}{\text{bandwidth}}$

$R_D = \frac{L}{CR}$

$Q = 2\pi fCR_D$

$V_S = V_P \frac{N_s}{N_p}$

$I_P = I_S \frac{N_s}{N_p}$

$Z_P = Z_S \left(\frac{N_p}{N_s}\right)^2$

$I_C = \beta I_B$

$f_{step} = \frac{f_{crystal}}{A}$

$F_{out} = f_{crystal} \frac{N}{A}$

$c = 3 \times 10^8$ m/s

$\text{Gain (loss)} = 10\text{Log}_{10} \frac{\text{power out}}{\text{power in}}$ dB

$SWR = \frac{V_{max}}{V_{min}} = \frac{V_f + V_r}{V_f - V_r}$

$v = f\lambda$

$\text{Gain (loss)} = 20\text{Log}_{10} \frac{\text{voltage out}}{\text{voltage in}}$ dB

$Z_0{}^2 = Z_{in} \times Z_{out}$

$E = \frac{7\sqrt{erp}}{d}$

$\text{Return Loss} = 10\text{Log}_{10} \frac{\text{Reflected power}}{\text{Incident power}}$

$bw = 2(AF_{max} + \Delta f)$

erp= power × gain (linear)

$\text{Gain} = 10\text{Log}_{10} \frac{\text{power from Yagi}}{\text{power from dipole}}$ dBd