OCR
RECOGNISING ACHIEVEMENT

ADVANCED GCE
DESIGN AND TECHNOLOGY
Unit 8: Systems and Control Technology 2

2525/01

INSERT – FORMULAE SHEET

Friday 25 June 2010
Morning

Duration: 1 hour

INSTRUCTIONS TO CANDIDATES

- This insert is to be used as required.

INFORMATION FOR CANDIDATES

- This document consists of **4** pages. Any blank pages are indicated.

OCR is an exempt Charity

Turn over

General

Area of rectangle $= l \times w$

Area of triangle $= \dfrac{b \times h}{2}$

Area of circle $= \dfrac{\pi d^2}{4}$

Circumference of circle $= \pi d$

Volume of rectangular prism $= l \times w \times h$

Volume of cylinder $=$ area of base circle x h

Volume of cone $= \dfrac{\text{area of base circle x } h}{3}$

Electrical and Electronic Systems

$V = I \times R$

$W = V \times I$

Resistors in series $\qquad R_{total} = R_1 + R_2 + R_3$ etc.

Resistors in parallel $\qquad \dfrac{1}{R_{total}} = \dfrac{1}{R_1} + \dfrac{1}{R_2} + \dfrac{1}{R_3}$ etc.

OR

$$R_{total} = \dfrac{R_1 \times R_2}{R_1 + R_2}$$

Potential Divider $\qquad V_{out} = V_{in} \times \dfrac{R_2}{R_1 + R_2}$

Capacitor time constant $\qquad T = C \times R$

Capacitors in series $\qquad \dfrac{1}{C_{total}} = \dfrac{1}{C_1} + \dfrac{1}{C_2} + \dfrac{1}{C_3}$ etc.

Capacitors in parallel $\qquad C_{total} = C_1 + C_2 + C_3$ etc.

Mark space ratio $= \dfrac{T_{on}}{T_{off}}$

Astable frequency (f) $= \dfrac{1}{1.4 \times C_1 \times R_1}$

555 astable frequency (f) $= \dfrac{1.44}{(R_a + 2R_b)C}$

output high time $= 0.693(R_a + R_b)C$

output low time $= 0.693(R_b)C$

555 monostable time constant

on time $= 1.1 R_a C$

Voltage gain $= \dfrac{V_{out}}{V_{in}}$

Non inverting amplifier $\quad V_{out} = V_{in} \times \dfrac{(R_f + R_{in})}{R_{in}}$

Inverting amplifier $\quad V_{out} = -V_{in} \times \dfrac{R_f}{R_{in}}$

Summing amplifier $\quad V_{out} = -R_f \times (\dfrac{V_1}{R_1} + \dfrac{V_2}{R_2} + \dfrac{V_3}{R_3})$ etc.

Differential amplifier $\quad V_{out} = \dfrac{-R_f}{R_a} \times (V_2 - V_1)$

MOSFET $\quad g_m = \dfrac{\Delta I_d}{\Delta V_{gs}}$

Battery life $\quad$ battery capacity = current x time

Mechanical Systems

Moment $\quad$ = force x perpendicular distance

Stress $\quad = \dfrac{\text{force}}{\text{cross sectional area}}$

Strain $\quad = \dfrac{\text{change in length}}{\text{original length}}$

Young modulus of elasticity $= \dfrac{\text{stress}}{\text{strain}}$

Work done $\quad$ = force x distance moved

Power $\quad$ = force x velocity

Work done   = torque x angle turned

Power   = torque x angular velocity

Pneumatic Systems

Force   = pressure x area

Compression ratio $= \dfrac{\text{(gauge pressure + atmospheric pressure)}}{\text{atmospheric pressure}}$

Volume of air used   = area x stroke x compression ratio

Lifting load   = vacuum level x area