

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENGAJIAN TINGGI**

JABATAN AKADEMIK

PENILAIAN ALTERNATIF

SESI DIS 2020

DEJ 30013 : BASIC CONTROL SYSTEM

NAMA PENYELARAS KURSUS : ROKIAH BINTI HASSAN

KAEDAH PENILAIAN : PEPERIKSAAN ONLINE

**JENIS PENILAIAN : SOALAN ESSAY STRUCTUR
(2 SOALAN)**

TARIKH PENILAIAN : 05 JULAI 2021

TEMPOH PENILAIAN : 1 JAM

LARANGAN TERHADAP PLAGIARISM (AKTA 174)

**PELAJAR TIDAK BOLEH MEMPLAGIAT APA-APA IDEA, PENULISAN, DATA
ATAU CIPTAAN ORANG LAIN. PLAGIAT ADALAH SALAH SATU
PENYELEWENGAN AKADEMIK. SEKIRANYA PELAJAR DIBUKTIKAN
MELAKUKAN PLAGIARISM, PENILAIAN BAGI KURSUS BERKENAAN AKAN
DIMANSUHKAN DAN DIBERI GRED F DENGAN NILAI MATA 0.**

**(RUJUK BUKU ARAHAN-ARAHAN PEPERIKSAAN DAN KAEDAH PENILAIAN (Diploma) EDISI 6, JUN 2019,
KLAUSA 17.3)**

SECTION A : 50 MARKS
BAHAGIAN A : 50 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** essay structured questions.

ARAHAN:

Bahagian ini mengandungi DUA (2) soalan esei berstruktur.

QUESTION 1

SOALAN 1

CLO1
C3

- a) Draw and label a Block Diagram of a Close Loop Control System.

Lukis dan tandakan gambarajah blok bagi litar kawalan gelung tertutup.

[5 marks]

[5 markah]

CLO1
C3

- b) Solve the transfer function of the system shown in the figure A1 by using Block Diagram Reduction Method.

Selesaikan rangkap pindah bagi sistem yang ditunjukkan di Rajah A1 dengan menggunakan Kaedah Pengecilan Blok Diagram.

[12 marks]

[12 markah]

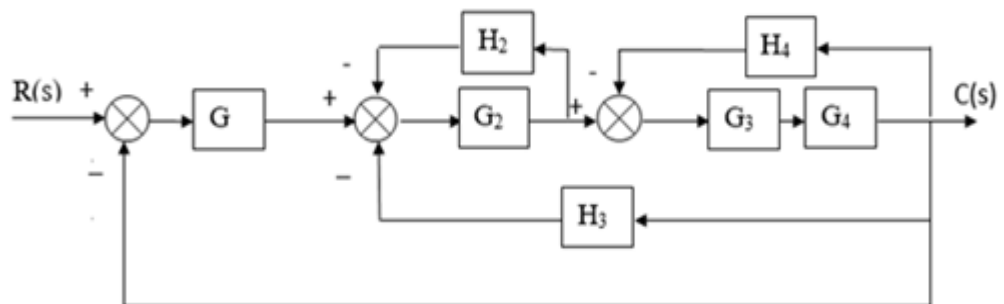


Figure A1 (b) / Rajah A1 (b)

CLO1
C3

- c) Referring to Figure A1(c) , calculate all the values of poles and zeros for the system and then sketch the system's poles and zeros on the s-plane.

Dengan merujuk gambarah A1(c), kira semua nilai bagi kutub dan sifar untuk system tersebut dan kemudian lakarkan kutub dan sifar untuk sistem tersebut di atas satah -s

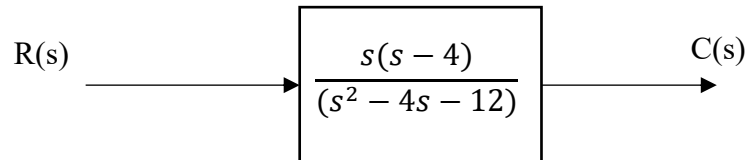


Figure A1(c)/Rajah A1(c)

[8 marks]

[8 markah]

QUESTION 2
SOALAN 2

CLO1
C3

- a) The range of measured variable for a certain control system is 4mV to 14mV and set point of 8mV. Calculate the error in percentage when the measured variable is 7.5mV.

Julat bagi pembolehubah yang diukur untuk sesuatu system kawalan ialah 4mV hingga 14mV dan titik untuk system tersebut 8mV. Kirakan ralat di dalam peritus apabila pembolehubah yang diukur ialah 7.5mV.

[5 marks]

[5 markah]

CLO1
C3

- b) By referring to the Figure A2(b), calculate the output value of PD controller when $K_p = 3\%$ and $K_D = 0.5\%$ with $p(0) = 20\%$.

Berdasarkan kepada Rajah A2(b), kirakan nilai keluaran bagi pengawal jenis PD apabila $K_p = 3\%$ dan $K_D = 0.5\%$ dengan $p(0) = 20\%$.

[7 marks]
[7 markah]

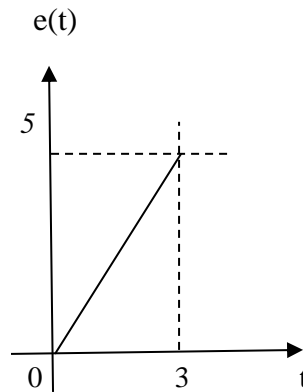


Figure A2(b)/Rajah A2(b)

CLO1
C3

- c) A Proportional + Integral (PI) controller is used to control certain processes. The settings of the controller are $K_p = 4\%$ and $K_i = 5\%$ per min. While $p(0) = 3\%$, the error signal is found to be $10t + 4$ where t is the time. Calculate the controller output in % after 0.5 minute.

Satu pengawal perkadaran + kamiran (PI) digunakan untuk mengawal proses tertentu. Tetapan $K_p = 4\%$ dan $K_i = 5\%$ setiap minit. Manakala $p(0) = 3\%$ isyarat ralat ialah $10t + 4$ dimana t ialah masa. Tentukan nilai % keluaran pengawal dalam selepas 0.5 minit.

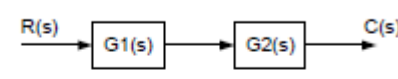
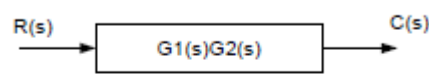
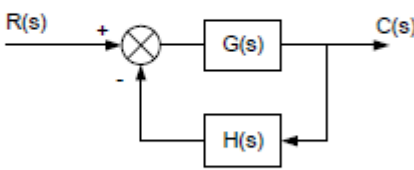
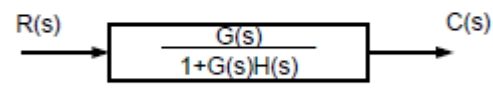
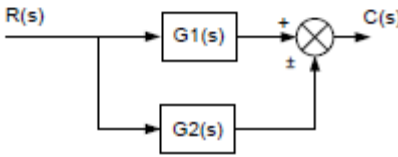
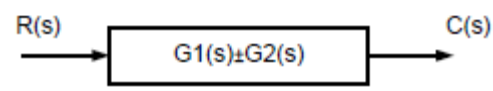
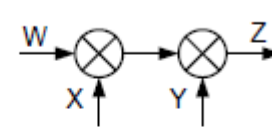
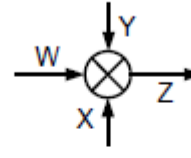
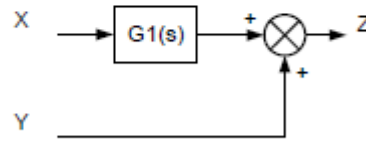
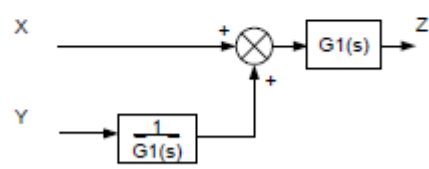
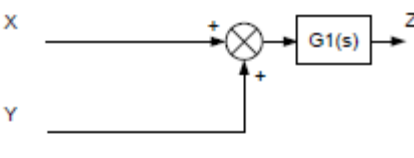
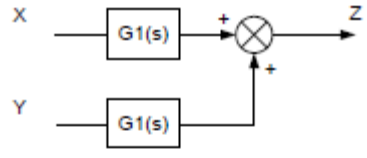
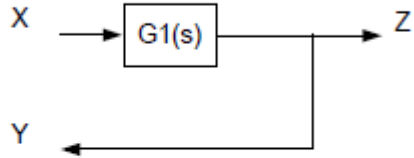
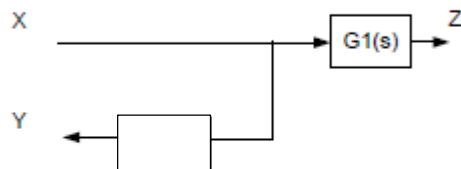
[13 marks]
[13 markah]

SOALAN TAMAT

Standard Laplace Transform Pairs

$f(t) = \mathcal{L}^{-1}\{F(s)\}(t)$	$F(s) = \mathcal{L}\{f(t)\}(s) = \int_0^{\infty} e^{-st} f(t) dt$
1	$\frac{1}{s}, \quad s > 0$
$t^n, \quad n \text{ an integer}$	$\frac{n!}{s^{n+1}}, \quad s > 0$
e^{at}	$\frac{1}{s-a}, \quad s > a$
$\sin bt$	$\frac{b}{s^2 + b^2}, \quad s > 0$
$\cos bt$	$\frac{s}{s^2 + b^2}, \quad s > 0$
$e^{at} f(t)$	$F(s-a)$
$e^{at} t^n, \quad n \text{ an integer}$	$\frac{n!}{(s-a)^{n+1}}, \quad s > a$
$e^{at} \sin bt$	$\frac{b}{(s-a)^2 + b^2}, \quad s > a$
$e^{at} \cos bt$	$\frac{(s-a)}{(s-a)^2 + b^2}, \quad s > a$
$t \sin bt$	$\frac{2bs}{(s^2 + b^2)^2}, \quad s > 0$
$t \cos bt$	$\frac{s^2 - b^2}{(s^2 + b^2)^2}, \quad s > 0$
$y' = \dot{y} = \frac{dy}{dt}$	$sY(s) - y(0)$
$y'' = \ddot{y} = \frac{d^2y}{dt^2}$	$s^2Y(s) - sy(0) - \dot{y}(0)$

BLOCK DIAGRAM REDUCTION TABLE

Case	Original structure	Equivalent structure
1		
2		
3		
4		
5		
6		
7		
8	