QUIZ IVA

Maximum Marks: 50 **Duration: 1 h**

Consider a SISO process with $G_p = \frac{2e^{-s}}{(5s+1)^3}$

a) Obtain Zeigler-Nichols tuning parameters for P, PI and PID controllers. 10

b) Set $\tau_I = P_U$ (P_U is ultimate period). Obtain K_C for a PI controller for a gain margin of 2. 10

c) Set $\tau_I = P_U$ (P_U is ultimate period). Obtain K_C for a PI controller for a phase margin of 45°. 10

d) Set $\tau_I = P_U$ (P_U is ultimate period). Obtain K_C for a PI controller for a maximum closed loop log modulus of 2dB. 20

Show all calculations clearly. No credit otherwise, even if stated answers are correct.

Use Matlab functions such as *fzero*, *fsolve* etc for any iterative calculations.

Zeigler-Nichols tuning Table

Controller	K_C	τ_I	τ_D
P	$K_U/2$	-	-
PI	$K_U/2.2$	$P_U/1.2$	-
PID	$K_U/1.7$	$P_U/2$	$P_U/8$