

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -I EXAMINATION- 2024

M.Tech-I Semester (/ECE)

COURSE CODE(CREDITS): 21M1WEC141 (03)

MAX. MARKS: 15

COURSE NAME: Advanced Control Systems

COURSE INSTRUCTORS: Dr Rajiv Kumar

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q-1: (a) Write a short note on the importance of mathematical model in control system design.

Comments on simplicity of model and accuracy of system designed with reference to mathematical modeling of system. [CO-1, 2]

(b) Differentiate between modern control theory and conventional control theory. Explain with example. [CO-1, 2]

(c) Following state space model is given:

$$\dot{x} = Ax + Bu$$

$$y = Cx + Du$$

Derive the equivalent transfer function $G(s) = C(sI - A)^{-1}B + D$ from the above set of state equation [CO-1, 2]

Q-2: (a) Give one example for each of the following systems—hydraulic, thermal, and electrical—along with their respective transfer functions. [CO-1, 2]

(b) Justify, Why Integral (I) and Derivative (D) Controllers Cannot Be Used Alone. [CO-1, 2]

(c) Explain with example, the predictive feature of of derivative controller. [CO-1, 2]

Q-3: (a) Give voltage and current equations of series R, L and C system and write the transfer function also.

You can decide input and output variable yourself.

[CO-1, 1.5]

(b) Find the transfer function of the electronic system given below

[CO-1, 1.5]

