B.Tech. SEM -VI Electrical 2014 Course (CBCS) : SUMMER - 2019

SUBJECT: MODERN CONTROL SYSTEMS

Day: Monday
Date: 27/05/2019

S-2019-2735

Time: 02.30 PM TO 05.30 PM
Max Marks: 60

N.B.:

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable calculator is **ALLOWED.**
4) Assume suitable data, if necessary.

Q.1 **a)** State the drawbacks of transfer function approach of analysis. What are the advantages of state-variable approach over classical approach? **(05)**

b) Define the concept of state, state variables, state vector and state space. Draw the block diagram representation of General Control System. **(05)**

OR

Q.1 **a)** Explain in detail with diagram and mathematical expressions the state model of a linear single input single output system. **(05)**

b) State one application of state model in Power Sector. **(05)**

Q.2 **a)** Explain homogeneous and non-homogeneous linear time invariant systems. **(05)**

b) Derive the solution of state equation for linear time invariant system. **(05)**

OR

Q.2 **a)** Describe the importance of State Transition Matrix (STM). **(05)**

b) Explain the methods to determine STM using Infinite series method. **(05)**

Q.3 **a)** Explain the concept of describing function. **(05)**

b) Describe the derivation of describing function of various non linear elements. **(05)**

OR

Q.3 **a)** Justify stability analysis using describing function. List the merits and demerits of describing function method. **(05)**

b) Explain the concept of existence of limit cycle. **(05)**

Q.4 Solve the following difference equation by using z-transform method. **(10)**

$f(k+2) + 3f(k+1) + 2f(k) = 0;$

$f(0) = 0, f(1) = 1$

OR

Q.4 Find the response of the system described by the difference equation: **(10)**

$f(k+2) - 5f(k+1) + 6f(k) = u(k)$

Given that , $f(0) = 0$ and $f(1) = 1$

Q.5 Explain in detail analysis of discrete time system using routh's criteria with suitable mathematical equations/example. **(10)**

OR

Q.5 Explain derivation of Pulse Transfer function of closed loop system. Write necessary mathematical equations and draw figure/block diagram. **(10)**

Q.6 Write short notes on adaptive control system. Draw block diagram and explain working with practical applications. **(10)**

OR

Q.6 Write short note on Model reference Adaptive control system. Draw block diagram and explain working with practical applications. **(10)**

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