

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, May 2021**

**Programme Name: B.Tech ASE+AVE**  
**Course Name : Mathematical Modeling and Simulation**  
**Course Code : AVEG 4003**  
**Nos. of page(s) : 02**

**Semester : VIII**  
**Time : 03 hrs**  
**Max. Marks : 100**

**SECTION A**  
**[5x6=30]**

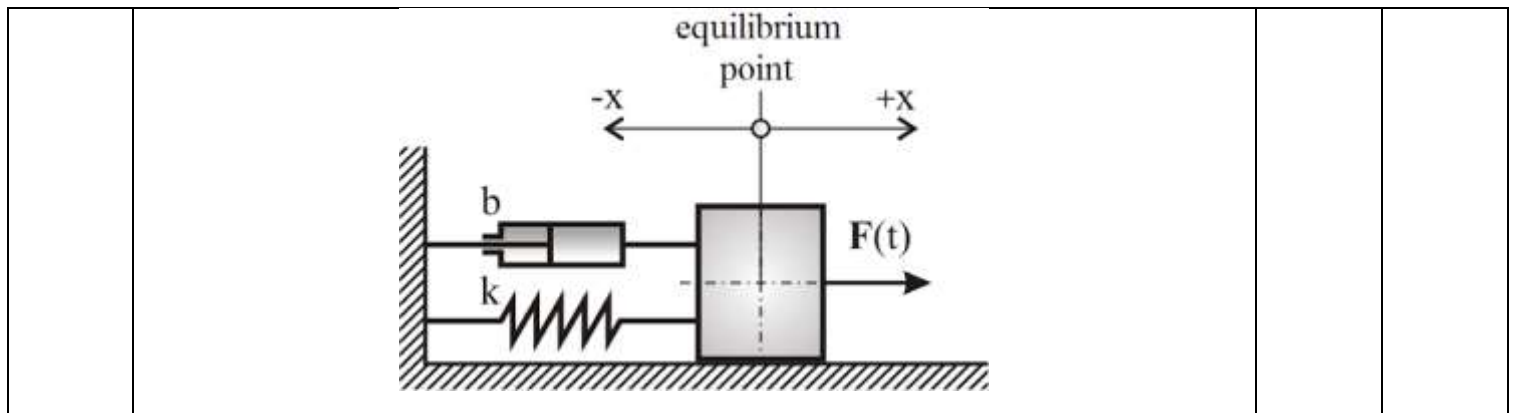
**Type the Answers**

S. No.		Marks	CO
Q 1	Discuss the term “Linearization” and “Non-Linearization” for system theory analysis	5	CO1
Q 2	Give a few example of reversible and irreversible process in system analysis	5	CO2
Q 3	Provide the example of Discrete and continuous mathematical model	5	CO 3
Q 4	How orders of differential equations are used for discretizing the system models	5	CO 4
Q 5	What are the various applications of Mathematical models used in different Industrial applications?	5	CO1
Q 6	Discuss the regression analysis and correlation values.	5	CO4

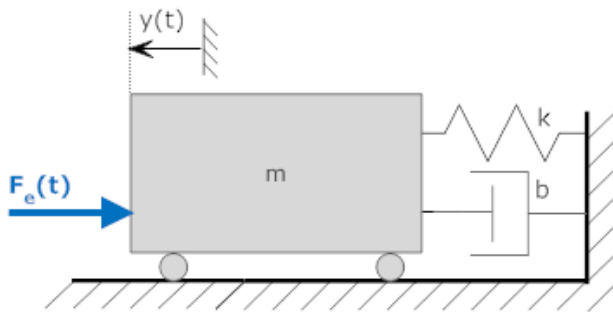
**SECTION B**  
**[10x5=50]**

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Q 7	<p>Discuss the interpretation of the below Figure in detail</p> <pre> graph TD     RS([Real situation]) -- "understand simplify" --&gt; RWM([Real world model])     RWM -- "mathematise" --&gt; MM[Mathematical model]     MM -- "mathematical work" --&gt; MR[Mathematical result]     MR -- "interpret" --&gt; RWMR([Real world meaning of result])     RWMR -- "validate" --&gt; RWM     RWM -- "validate" --&gt; RS     </pre>	10	CO2
Q 8	Derive model equation for the data flow as given below	10	CO 3



Q 9 Derive the model equation for the system as shown below

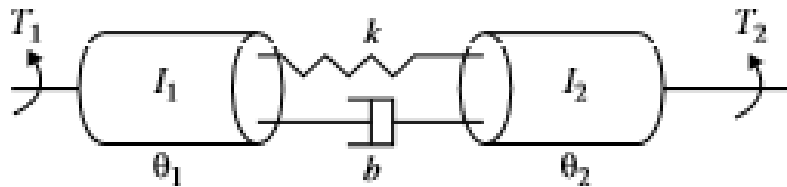


10 CO 3

Q 10 Discuss 'perturbation'. How would you classify the nominal and perturbation values? Using this theory, linearize the rigid body kinetics under equilibrium condition. Also, provide the equation of surge using the linearized perturbation theory.

10 CO 2

Q 11 Derive the transfer function equation for the torque mechanism as shown below



10 CO 1

**SECTION-C**  
[1x20=20]

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**CO4**

Q 12 Discuss the Mathematical Modelling of exponential growth and decay system used for the various engineering real life applications. Derive the model equation for the same.