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University of Asia Pacific
Department of Civil Engineering
Midterm Examination Spring 2016
Program: Master in Civil Engineering

Course Code: CE 6118
Course Title: Structural Vibration Control

Time: 60 Minutes
Full Marks: 3 x 20

ANSWER ALL QUESTIONS. *The figures are not drawn to scale.*

[1] Answer the following questions

- a) Write down different cases of single-degree-of-freedom-system (SDOFs) with appropriate sketches? What is damping? Why damping is so important for vibration control of dynamical system (make a sketch if necessary)? (10)
- b) What is natural frequency? Derive the relationship for angular natural frequency and damped natural frequency for the dynamical system shown in Figure 1? (10)

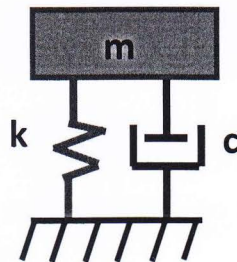


Figure 1

- [2] Determine the displacement equations of the dynamical system shown in Figure 2. Estimate displacement for time steps $t = 0, 0.18$. Consider $m = 10 \text{ Kg}$, $k = 800 \text{ N/m}$, $c = 8.9443 \text{ N-s/m}$, $\phi = 0$, $x(0) = 0$, $\dot{x}(0) = 0$. (20)

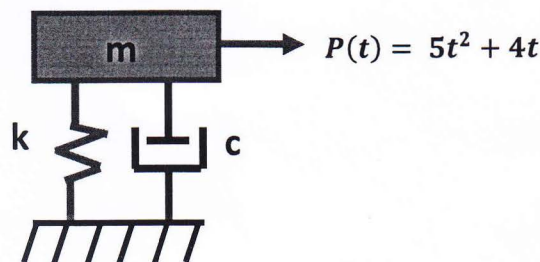


Figure 2

- [3] Why vibration control is so important? Write down a short note on different control approaches with appropriate figures and closed-loop wherever necessary. (20)

University of Asia Pacific
Department of Civil Engineering
Midterm Examination
Spring 2016
Program: M.Sc Engineering (Civil)

Course Title: Transportation Planning
Full Marks: 20

Course Code: CE 6510
Time: 1hour

There are **Three** questions. Answer two of them

1. a) Trip productions and attractions, travel time between zones for a 3 zone study area are given as follows: 9

Trip production-attraction

| Zone | 1 | 2 | 3 | Total |
|------------------------|-----|-----|-----|-------|
| Trip Production | 150 | 350 | 250 | 750 |
| Trip Attraction | 300 | 280 | 170 | 750 |

Travel time between zones (min)

| Zone | 1 | 2 | 3 |
|----------|---|---|---|
| 1 | 4 | 3 | 5 |
| 2 | 3 | 6 | 6 |
| 3 | 5 | 6 | 5 |

Determine the number of trips between Each zone using gravity model. Assume Socio-economic factor 1.

Friction Factor

| Time (min) | F value |
|------------|---------|
| 1 | 82 |
| 2 | 52 |
| 3 | 50 |
| 4 | 41 |
| 5 | 39 |
| 6 | 26 |
| 7 | 20 |
| 8 | 13 |

- b) What is meant by travel demand forecasting? 1
2. a) What are the advantages and disadvantages of saturation system? 2
- b) There are four alternative plan proposals for four regions: Plan A, Plan B, Plan C, and Plan D with different road length, populations and productivity. The details are given in the following table: 8

| Proposal | Road length (Km) | No of towns and villages served with population range | | | | Productivity (1000 tones) |
|----------|------------------|---|-----------|------------|--------|---------------------------|
| | | 1001-3500 | 3501-7000 | 7001-12500 | >12500 | |
| A | 410 | 250 | 90 | 35 | 5 | 320 |
| B | 560 | 300 | 95 | 55 | 7 | 280 |
| C | 720 | 360 | 120 | 60 | 11 | 315 |
| D | 650 | 370 | 124 | 80 | 13 | 355 |

Work out the utility per unit length for each of the road systems and indicate which of the plans yield the maximum utility based on saturation system.

Assume utility units as given below:

Population: 1001-3500 Utility unit = 0.25
 3501-7000 Utility unit = 0.50
 7001-12500 Utility unit = 1.00
 > 12500 Utility unit = 2.50

Productivity unit 1.00 for each 1000 tons product.

3. a) Name the factors that influence travel demand. 2
 b) A city planner investigated that in 6 zones of a town the number of convenient store in relation to the population. In 1000s was as follows: 8

| | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|
| Y | 2 | 7 | 3 | 5 | 8 | 9 |
| X | 5 | 4 | 6 | 3 | 4 | 6 |

Set up a linear equation connecting Y in terms of X, and Determine R^2

University of Asia Pacific
Department of Civil Engineering
Midterm Examination Spring 2016
Program: Master in Civil Engineering

Course code: CE 6608

Course title: Irrigation and Drainage Engineering

Time: 60 Minutes

Total marks: 20

Answer all questions

1. What are the harmful effects of excess irrigation? 1
2. Derive the relationship between depth of irrigation water, electric conductivity of drainage water, electric conductivity of irrigation water and consumptive use of water. 3
3. Calculate the irrigation requirement of a wheat crop when the leaching requirement of a wheat soil is 15% and the soil water has been depleted 60%. The available water holding capacity of the root zone is 12 cm. 4
4. A sample of water from a well showed that it has an electrical conductivity of 1.5 mmhos/cm and a density of 1 gm/cm³. A field with a bulk density of soil of 1.43 gm/cm³ and saturation point of 40 percent will be irrigated. The electric conductivity (EC) value of saturated extract of soil is 2 mmhos/cm. Find out the depth of irrigation that may turn the 30 cm depth of soil saline ignoring the precipitation and leaching of salts that may occur. 3
5. What is meant by "Border Flooding", and how does it differ from "Check Flooding" and "Free Flooding"? 4
6. Wheat has to be grown at a certain place, the useful climatological conditions of which are tabulated below. Determine the consumptive use and net irrigation requirement of wheat crop. Also determine the field irrigation requirement if the water application efficiency is 77%. Use Blaney-Cridle equation and a crop factor is 0.75. 5

| Month | Monthly temperature (°C) averaged over the last 5 years | Monthly percent of day time hour of the year computed from the Sunshine | Useful rainfall in cm averaged over the last 5 years | Leaching requirement (cm) |
|----------|---|---|--|---------------------------|
| November | 20.0 | 7.40 | 1.50 | 4 |
| December | 18.0 | 7.25 | 1.35 | 6 |