

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2017

00867

**BICEE-013 : ELEMENTS OF SOIL DYNAMICS
AND MACHINE FOUNDATION**

Time : 3 hours

Maximum Marks : 70

Note : Answer any *five* questions. All questions carry equal marks. Assume missing data, if any. Use of scientific calculator is permitted.

1. Differentiate between free and forced vibration in case of undamped and damped conditions for a single degree of freedom. Write the equations used. 14

2. A machine of mass 1000 N is supported on springs of total stiffness 784 N/mm. The machine produces an unbalanced disturbing force of 395 N at a speed of 50 cps. If the damping factor is 0.2, find : 14
 - Amplitude of motion
 - Transmissibility
 - Transmitted force

3. What is fixed-free condition in a resonant column test ?

A soil specimen is tested in a resonant column device (torsional vibration and fixed-free condition) for the determination of shear modulus. The data given are length, diameter and mass of the specimen as 90 mm, 35 mm and 150 gm respectively. If the frequency at a normal mode of vibration ($n = 1$) is 800 cps, find the shear modulus of the specimen.

14

4. Discuss the factors affecting the shear strength of cohesive soils under static and dynamic loads. Explain the effect of dynamic stress level.

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5. Determine the change in the percentage amplitude in terms of frequency ratio, if the soil mass participating in the vibration is 25% of the mass of the machine. Use Barker's expressions.

14

6. What are the codal recommendations for the design of foundations for a reciprocating type machine ?

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7. Explain modified Culmann's graphical method for the estimation of active earth pressure in dynamic condition. What is the effect of uniformly distributed live load ?

14

8. What are the assumptions made for the dynamic response of a strip footing supported by $C-\phi$ soil ? Discuss how the horizontal transient load is estimated.

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