# MODEL QUESTION PAPER

**MFM1**

## I Semester M.TECH Examination, August 2011
## MACHINE VIBRATION ANALYSIS

Time: 3 Hours                                              Max. Marks: 75

### GROUP A : Answer any three questions.

Q. 1    Is the motion of a piston in reciprocating engine a SHM? Explain.

Q. 2    Discuss different types of Damping?

Q. 3    Explain in detail different types of damping.

Q. 4    Find the sum of two harmonic motions of equal amplitude but of slightly different frequencies. Discuss the beating phenomena that result from this sum.?

Q. 5    Determine the frequency equation in transverse vibration for a uniform cantilever.

### GROUP B : Answer any three questions

Q. 6    Determine the flexibility of a simple supported inform beam of length L at a Point 1/3 L from the end?

Q. 7    In a cantilever if the support is not 100% rigid, how will it affect natural frequency of the system?

Q. 8    A torsional pendulum has to have a natural frequency of 5Hz. What length of the steel wire of diameter 2 mm should be used for this pendulum? The inertia of mass fixed at the free end is 0.098 kg-m^2. Take $G = 0.83 \times 10^{11}$.

Q. 9    A light cantilever of length l has a mass M fixed at its free end . Find the frequency and he static deflection of the system?

Q. 10   Explain in detail the vibrations in a geared system.

### GROUP C: All Questions are Compulsory.

### Q.11  Fill in the blanks

(i)      A slider crank mechanism has _____no of DOFs.

(ii)     The factor which affects the critical speed of shaft is _____.

(iii)    _____ curves gives the response of the system to various frequencies.

(iv)     Accelerometer is the instrument with _____ natural frequency

(v)      A light shaft having a non central disc having mass as well as moment of inertia will have _____ critical speeds.

### Q.12  Multiple choice question.

(i)      Stodola's method is _____.
         (a) Exact method              (b) Analytical method
         (c) Numerical method          (d) None of this

(ii)     When there is a reduction in amplitude over every cycle of vibration then the body is said to have _____.
(a)  Free vibration              (b) forced
(c)  Damped                      (d) none of the above

(iii)    Damping force is proportional to _____.
(a)  Displacement               (b) Velocity
(c)  Acceleration               (d)  None of these

(iv)    Simplest form of a periodic motion is _____.
(a)  Harmonic motion            (b)  Oscillatory motion
(c)  Vibrating motion           (d)  None

(v)     For most structural materials the energy dissipated for cyclical reversal of loading is proportional to _____.
(a)  Amplitude                  (b)  Square of amplitude
(c)  Square root of amplitude

## Q.13  True or false

(i)      It is safe to run the shaft at critical speed.
(ii)     Hertz and cycle/sec is the same thing.
(iii)    Amplitude of vibration becomes zero at resonance.
(iv)     When the motion is repeated in equal intervals of time it is called periodic motion.
(v)      Houdaille damper is commonly used for damping out torsional vibrations.

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