Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name: Dynamic of Machines

Subject Code: 4TE05DOM1 Branch: B.Tech (Mechanical)

Semester: 5 Date: 30/03/2017 Time: 02:30 To 05:30 Marks: 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 Attempt the following questions: (14)

a) Necessity of balancing in high speed engines, Why? **(1)**

b) Define radial engines. **(1)**

c) A reed type tachometer use the principle of **(1)**
(a) transverse vibration (b) torsional vibration (c) longitudinal vibration (d) damped free vibration

d) What do you mean by vibration isolation? **(1)**

e) The factor which affects the critical speed of a shaft is **(1)**
(a) diameter of disc (b) span length of shaft (c) eccentricity (d) all of these

f) Write the remedies of vibrations. **(1)**

g) Under logarithmic decrement, the amplitude of successive vibrations are **(1)**
(a) constant (b) in arithmetic progression (c) in geometric progression (d) in logarithmic progression

h) Differentiate between static and dynamic balancing. **(1)**

i) Which type of instruments do not require separate power source for measuring vibratory response of a vibratory system? **(1)**
(a) active instrument (b) passive instrument (c) contacting type (d) non-contacting type

j) What are the effects of critical speed of shaft? **(1)**

k) In steady state forced vibrations, the amplitude of vibrations at resonance is ……. to damping coefficient **(1)**
(a) equal (b) inversely proportional (c) directly proportional (iv) independent

l) Define damping ratio. **(1)**

m) FFT stands for **(1)**
(a) fourier frequency transform (b) fast frequency transform (c) fast fourier transform (d) frequency forbidden transform

n) What are the conditions of dynamic balancing? **(1)**

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	
	a)	Define V-engines and explain concept of multi cylinder in-line engines.	**(07)**
	b)	Explain partial balancing in locomotives and discuss its effects in locomotive.	**(07)**
Q-3		**Attempt all questions**	
	a)	Sketch and labelled dynamics balancing machines and write its applications and limitations.	**(07)**
	b)	Four masses A, B, C and D are completely balanced. Masses C and D make angles of 90^o and 210^o respectively with B in the same sense. The planes containing B and C are 300 mm apart. Masses A, B, C and D can be assumed to be concentrated at radii of 360,480, 240 and 300 mm respectively. The masses B, C & D are 15Kg, 25Kg & 20Kg respectively. Determine (i) The mass A and its angular position (ii) The position of planes A and D	**(07)**
Q-4		**Attempt all questions**	
	a)	Classify and explain types of vibrations and discuss the elements used in vibratory system.	**(07)**
	b)	A spring mass damper system has a mass of 80 kg suspended from spring having stiffness of 1000 N/m and a viscous damper with a damping coefficient of 80 N-s/m. If the mass is subjected to a periodic disturbing force of 50 N at undamped natural frequency, determine (i) undamped natural frequency (ii) damped natural frequency (iii) amplitude of forced vibration (iv) phase difference between force & displacement.	**(07)**
Q-5		**Attempt all questions**	
	a)	Derive the expression for naturally frequency for free vibration using equilibrium and energy method	**(07)**
	b)	Derive the characteristic equation of damped free vibration system and also derive the general solution of any one type of damped system	**(07)**
Q-6		**Attempt all questions**	
	a)	Define force & motion transmissibility and derive an expression for it?	**(07)**
	b)	A machine of mass 60Kg is placed on four springs. The mass of reciprocating parts of a machine is 3Kg which moves through a stroke of 100 mm. The speed of crank is 800 rpm. The damping is introduced into the system to reduce the amplitudes of successive vibrations by 20 %. Find: (i) The stiffness of each spring, if the damper is removed and the force transmitted to the foundation is $(1/10)^{th}$ of the impressed force? (ii) The force transmitted to the foundation at 800 rpm	**(07)**
Q-7		**Attempt all questions**	
	a)	Explain the method to determine the critical speed of shaft carrying single rotor, considering without damping.	**(07)**
	b)	A shaft 50 mm diameter and 3 m long is simply supported at the ends carries three loads of 100 kg, 150 kg and 75 kg at 1 m, 2 m and 2.5 m from the left support. The modulus of elasticity of the shaft material is 2×10^5 MPa. Find the critical speed of the shaft by using Dunkerley's method	**(07)**
Q-8		**Attempt all questions**	
	a)	Define cam dynamics and write the significance of force analysis of cam	**(07)**
	b)	Explain construction & working principle of any vibration measuring instruments	**(07)**