Production Engineering & Mechanical Design Department
Final Term Exam (Semester/year: 2/2012/2013)

Industrial Maintenance

3rd year students.

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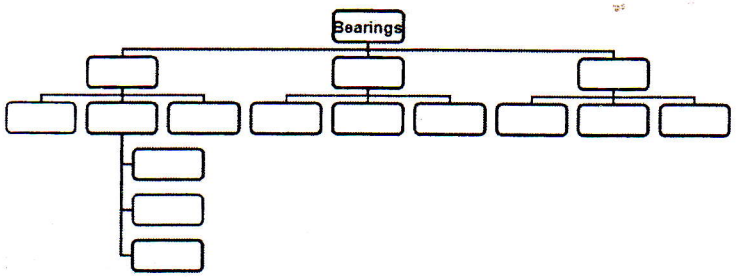
Date: 11/6/2013
Time: 3 hours.
Total Marks = 60

Answer the following questions:

Q#1: **(10 Marks)**

(a) What is troubleshooting? What are the troubleshooting aids? What are the main requirements for a good troubleshooter?

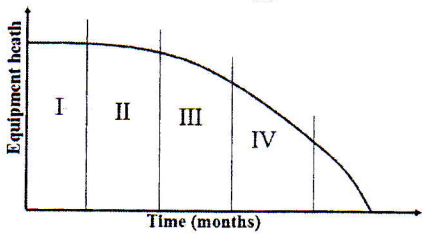
(b) According to the type of friction the bearing can be classified, use the following chart to classify these bearings? Draw a sketch for each type?



(c) What are the properties of lubricating oils and greases? How to select each one of them as a lubricant?

(d) Selecting lubricating oils depends on several factors? Write 5 factors?

(e) For each period (I, II, III, IV) of equipment operating time what is the best non-destructive testing should be used as predictive maintenance technology?



Q#2: **(10 Marks)**

Using well organized tables, in a clear and precise points, What are the strategies, main activities, advantages, disadvantages, examples of applications of:

(a) Active maintenance
(b) Predictive maintenance
(c) Preventive maintenance
(d) Pro-active maintenance
(e) Reliability centered maintenance

	Strategy	Activities	Advantages	Disadvantages	Examples
a					
b					
c					
d					
e					

Q#3: **(10 Marks)**

For the given non-destructive techniques use the following format to help company administration in their decision making, (a) Thermography, (b) Ultra-sound, (c) Visual Inspection, (d) X_ray, (e) Liquid penetrant, (f) Vibration analysis, (g) Magnetic particles?

	Sketch	Basis	Measured parameters	Defects could be diagnosed	Advantages	Limitations
a						
b						
c						
d						
e						
f						
g						

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Allowed Table (None)

This exam measures ILOS no:(a_1,a_5,a_6,$a_{19}$$b_2$,$b_6$,$b_9$,$c_5$,$c_6$,$c_{18}$,$d_1$)

Answer all the following Qustions

Question(4) (10marks)

1) Explain with sketch and examples:-

a) balancing quality chart.
b) Overall level.
c) Spectrum analysis.
d) Modal testing.
e) Operational modal analysis.
f) Crest factor.
g) Factor affecting Isolation.
h) Nyquist diagram

2) Make complete design for balancing report for fane with four blades taking into consideration (instruments- position of measurement- procedure-vector diagram-check-remarks).

Question (5) (10marks)

Discuss in detail : 1-Misalignment and bent shaft detection-2- Diagnosis using block diagram-3- fault detection using vibration analysis in rolling elements in mechanical system.

Question (6) (10marks)

a)-How do determine system characters of tractor from resonance curve when a transducer records a vertical r.m.s acceleration of (3 m/sec^2) at 8 Hz, would this Level be desirable for operator? Why? calculate the amplitude in dB

b)**Choose the correct answer:**

Vibration monitoring effectiveness depends on:
-Analyst's ability
-Sensor mounting
-Wavelet
-Crest factor

Technique for visualization of vibratory movement of machine under it's operation load is called
-Modal analysis-Operation deflection shape-Finite element method

Coherence can not provide any meaningful information in which of the following cases
-Detection a bearing defect in high frequency range.
-Reduce the number of sensors.
-Selection the location of sensors .

(GOOD LUCK)