Questions for NPTEL Course on Machinery Condition Monitoring and Signal Processing

Q.1 What are the three types of machinery maintenance techniques?

(Answer: Preventive, Predictive, Reactivs)

Q.2 What are the theoretical minimum and maximum values of the risk priority number in a FEMCA study?

(Answer: 1 and 1000)

Q.3 What information does one obtain by prognosis of a fault?

(Answer: Remaining useful life)

Q.4 What are fault tolerant sensors?

(Answer: Can take corrective actions when a fault develops in the sensor)

Q.5 What should be the kurtosis value of a time domain vibration signal from a defective gearbox?

(Answer: Greater than 6)

Q.6 When are journal bearings preferred in rotating machines?

(Answer: In order to support very large rotor weights)

Q.7 What are squeeze film dampers?

(Answer: Provide oil to the bearings which provides damping)

Q.8 What is the oil whirling frequency of a rotating shaft?

(Answer: About 0.42 to 0.48 times the rotational speed)

Q.9 What is the name of the industry preferred transducer for contact type vibration measurement?

(Answer: Accelerometer)

Q.10 What is the principle behind a hall-effect sensor?

(Answer: A voltage is developed across a semi-conductor material due to the presence of a magnetic field and an electrical field in mutually perpendicular direction)

Q.11 How can signal aliasing be prevented in a data acquisition system?

(Answer: By having a low pass analog anti-aliassing filter with a cutoff frequency half the sampling frequency of the data acquisition system)

Q.12 What is the effect of the computer bit-size on the amplitude resolution of the digitally acquired signal?

(Answer: Inadequate amplitude resolution)

Q.13 What is “picket-fence”effect in FFT?

(Answer: Inadequate frequency resolution)

Q.14 What do you understand by lines of FFT?

(Answer: Measure of the total number of FFT data points, there is a relationship with the number of time data points)

Q.15 Why is windowing function used in FFT?

(Answer: To reduce leakage error)

Q.16 What is the physical significance of coherence signal?

(Answer: Indicates linearity between signals in the frequency domain)

Q.17 What are two fundamental sources of vibration in new rolling element bearings?

(Answer: Waviness and Surface Roughness)

Q.18 From vibration measurement what is the sure way of knowing that a rolling element bearing defect has occurred?

(Answer: High frequency vibration is the ultrasonic range)

Q.19 What do you understand by A-weighting in sound pressure level measurements?

(Answer: Corresponds to human ear’s weighting curve)

Q.20 Why is sound intensity measurements used for?

(Answer: Noise source identification)

Q.21 What is an anechoic chamber?

(Answer: Chamber with free field conditions)

Q.22 What is the advantage of motor current signature analysis over traditional vibration analysis?

(Answer: Can be used for remote monitoring)

Q.23 What is the difference between atomic absorption spectrophotometer and atomic emission spectrophotometer?

(Answer: AAS is specific for an element, AES is a measurement for a large number of elements)

Q.24 What is the principle behind eddy current based measurements?

(Answer: Change in electrical flux)

Q . 25 What is the principle behind the working of an ultrasonic thickness gauge?

(Answer: Measuring time of travel of ultrasonic waves in a material)

Q. 26 What is vane pass frequency in an impeller?

(Answer: Product of the rotating frequency and number of vanes in the impeller)

Q.26 What do you mean by a 0dB bandwidth of a filter?

(Answer: Frequency range where the amplitude of output is the same as the amplitude of the input to the filter)

Q.27 What are the common accelerometer mounting techniques?

(Answer: Handheld, beeswax, glue, stud, magnet)

Q.28 What is the typical value of the flank wear of a cutting tool, before it is put out of service?

(Answer: 500 micron)

Q.29 How are cutting tool forces measured in a CNC machine?

(Answer: Piezoelectric cutting force tool dynamometer)

Q.30 Where is cepstrum analysis used?

(Answer: Detection of family of sidebands)

Q.31 What are the common faults in electrical motors?

(Answer: Rotor bar fault, stator bar and winding fault, bearing fault, end ring fault, rotor eccentricity)

Q.31 Name two instruments used to measure rotating speeds?

(Answer: Phototach, Reluctance pickup)

Q.32 How is temperature measured in bearings on rotating machines?

(Answer: Thermocouple, RTDs)

Q. 33 How are thermocouples calibrated?

(Answer: Two fixed reference temperature like ice bath, boiling water)

Q.34 How is in-situ calibration of accelerometer made?

(Answer: Handheld oscillator)

Q.35 What is the principle of working behind a non-contacting laser based vibration measurement system.

(Answer: Doppler effect)

Q. 36 Name three windowing functions used in FFT?

(Answer: Hanning, Uniform, Flattop)

Q.37 What is ferrography?

(Answer: Detection of ferrous particles in oil sample)

Q.38 What is the importance of oil sampling in wear debris analysis

(Answer: True representation of the debris particle in the oil sample)

Q. 39 What is a white noise?

(Answer: Signal with all frequencies present)

Q. 40 What is a tuned dynamic absorber?

(Answer: A secondary system whose natural frequency is equal to that of the primary system to which it will be attached)

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