## METROLOGY AND DIGITAL MANUFACTURING, AAE 3158, 06<sup>TH</sup> Jan 2021

## Type: DES

Q1. With a neat sketch explain the working of NPL flatness interferometer. (5)

Q2. Define: Response time, Range, Readability. (3)

Q3. Differentiate between go gauge and no-go gauge. (2)

Q4. With a line diagram, differentiate between hole basis and shaft basis types of measurement system. (3)

Q5.Briefly explain the complimentary and deflection methods of measurement with an example. (3)

Q6. Define: Wavelength, Frequency, Cut-off. (2)

Q7. A clearance fit has to be provided for a shaft and bearing assembly having a diameter of 40 mm. Tolerances on hole and shaft are 0.006 and 0.004 mm, respectively. The tolerances are disposed unilaterally. If an allowance of 0.002 mm is provided, find the limits of size for hole and shaft when (a) hole basis system and (b) shaft basis system is used. (5)

Q8. Explain the working of a Sigma comparator. (4)

Q09. With a neat sketch explain the four different types of reference circles used for measurement of uncertainty in roundness. (4)

Q10. Explain the significance of Industrial IoT on machine learning and digital manufacturing. (3)

Q11. Briefly explain the three different surface roughness measuring methods with relevant equations. (3)

Q12. With a flow chart enumerate the steps involved in PLM integration with shop floor execution. (4)

Q13. Describe the constructional features of a CMM. (3)

Q14. With an example, show the propagation of uncertainty in mixed calculations. (3)

Q15. Briefly explain the significance of digital manufacturing and differentiate between physical and virtual validation in manufacturing planning. (3)