

Pre. Ph.D. Course Work (2017 Course) : (Mechanical Engg.) :

SUMMER - 2019

Subject: Paper-II Recent Advances in Mechanical Engineering

Day : Wednesday
Date : 24/04/2019

Time : 10.00 AM TO 1.00 PM
Max., Marks : 100

S-2019-5365

N.B.

- 1) All Questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** Marks.
- 3) Assume suitable data wherever necessary.

Q.1 Elaborate Region Elimination method in optimization. **(10)**

OR

Explain any two direct search methods of optimization problems.

Q.2 Enlist pressure measurement gauges. Explain bellow gauge in details. **(10)**

OR

Explain with neat sketch any two instruments used for temperature measurements.

Q.3 Explain 'Two Factor factorial design method' with suitable example **(10)**

OR

What is importance of Taguchi method? Describe with appropriate example.

Q.4 Describe with suitable example Student's t- test method **(10)**

OR

Explain the determination of overall uncertainties in experimental investigations and explain how errors analysis is carried out.

Q.5 Write a parametric representation of analytic curve. Explain Bezier and B-spline with neat sketch. **(10)**

OR

What do you understand by wire frame and surface modeling? What do you mean by homogeneous transformation?

Q.6 Explain Mohr's theory and modified Mohr's theory. **(10)**

OR

Explain maximum principle stress theory and differentiate between high cycle and low cycle fatigue with practical example of low cycle fatigue failure and high cycle fatigue failure

Q.7 Describe manufacturing methods and characterization of Nano- composites. **(10)**

OR

Explain in detail fiber Reinforced composite enumerate the desirable characteristics of fiber in FRC

- Q.8** What is ultrasonic machining? Explain its advantages and limitations with the help of block diagram. (10)

OR

A glass specimen is covered by metal mask with thickness 100 μm and a hole pattern of 80 μm diameter, specimen is a soda lime glass slide with size of 250 x 250 x 1.2 mm^3 . The air pressure of 3 MPa gives a jet stream velocity of 150 m/s. The AJMM system used Alumina as abrasive and set the feed rate at 0.02 g/s. How long would it take to get a through micro hole?

- Q.9** Define: Zeroth, first and second law of thermodynamics. Give physical significance of Kelvin Plank and Clause's statement. (10)

OR

Explain how real gases deviate from ideal gas. Write any two equations of state of real gas.

- Q.10** What is Computational fluid dynamics and explain concept of finite difference and finite volume methods in CFD. (10)

OR

Derive an equation for boundary layer thickness for forced convection flow over flat plate.

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