Pre. Ph.D. Course Work (2017 Course) : SUMMER - 2018
(Mechanical Engg.)
SUBJECT: PAPER – II- ADVANCES IN MECHANICAL ENGINEERING

Day : **Tuesday** | **S-2018-4789** | Time : **10.00 AM TO 01.00 PM**
Date : **26/06/2018** | Max. Marks : 100

N. B. :
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Assume suitable data wherever necessary.

Q.1 What are basic concepts of optimization? **(10)**

OR

How is single variable optimization conducted?

Q.2 What are different instruments used for measurement of pressure? **(10)**
Explain operation of piezoelectric sensor with the help of neat sketch.

OR

What are components of Data Acquisition System (DAS)?
Explain the operation of DAS.

Q.3 What is importance of conducting Design of Experiments (DOE)? **(10)**

OR

What do you understand by general factorial design methodology?

Q.4 What are the different errors in instruments? **(10)**
What are causes of instrumental errors?

OR

How is estimation of uncertainly conducted in case of Taylor's Series Method (TSM)?

Q.5 What do you understand by 'Bezier Curves'? **(10)**

OR

What do you understand by wire frame models and wise frame entities?

Q.6 What do you understand by Mohr's theory and modified Mohr's theory? **(10)**

OR

What is S-N curve? How fatigue life is estimated using S-N approach?

P.T.O.

Q.7 How is characterization of Nano-composites conducted? **(10)**

OR

What do you understand by interfaces and interphases in case of composites?

Q.8 How is physical vapor deposition and chemical vapor deposition conducted? **(10)**

OR

What are different methods of farming?
With the help of a neat sketch explain electroforming method.

Q.9 Define: Zeroth law of thermodynamics **(10)**
First law of thermodynamics for flow and non-flow processes
Second law of thermodynamics: Kelvin Plank and Clause's statements.
Give physical significance of each statement.

OR

What do you understand by entropy generation?
Give relationships for entropy generation for different processes.

Q.10 What is Prandtl number? **(10)**
How is it related with relative thicknesses of velocity and thermal boundary layers?
What is hydrodynamic and thermal entry length?

OR

Derive an expression for three dimensional form of Navier-Stokes equation in Cartesian coordinates.

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