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**Question Paper Code: 58761**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

One credit

Mechanical Engineering

15UME861 – SMART MATERIALS

(Regulation 2015)

Duration: 1.30 hours

Maximum: 30 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- Piezo-electric materials are used in
  - Transducer
  - Load gauges
  - Batteries
  - Switches
- \_\_\_\_\_ which respond with a change in shape on the application of mechanical stress
  - Wooden materials
  - Plastic materials
  - Iron materials
  - Smart materials
- \_\_\_\_\_ type charge sensor for highly sensitive detection of a DNA sequence.
  - JFET
  - PTFE
  - LED
  - FET
- A smart material may be considered as a replacement for a ----- material.
  - Traditional
  - Conventional
  - Un conventional
  - Recycle
- Self-healing may also be achieved through deliberately applied \_\_\_\_\_ mechanisms.
  - psychological
  - chemical
  - mechanical
  - obvious
- Light sensors are used in \_\_\_\_\_
  - Lights
  - Electric switches
  - Pyroelectric materials
  - Piezoelectric materials
- Glass fiber tensile strength is \_\_\_\_\_ (GPa)
  - 3.5 to 4.6
  - 3.2
  - 4.6 to 5.0
  - 2.3

8. Embedding sensors within structures to monitor \_\_\_\_\_ and damage can reduce maintenance costs and increase lifespan.
- (a) Strain                      (b) Temperature                      (c) Stress                      (d) Condition
9. Smartness describes self-adaptability, ----- memory and multiple functionalities of the materials or structures.
- (a) Self – assembly                      (b) Self-sensing                      (c) Capability                      (d) Consciously
10. PTFE means \_\_\_\_\_
- (a) Polytetra-fluid emulsion                      (b) Polytetrafluoroethylene
- (c) Polytetra fluorescence                      (d) Polytetra fluid ethanol

PART – B (1x 20 = 20 Marks)

11. (a) (i) Explain the various Application of Smart Materials in Biomedical (artificial lungs, DNA chips, smart hydrogels). (10)
- (ii) Explain the various Application of Smart Materials in Sensors. (10)  
(gas, vapors, temperature, strain, stress, adaptive structures)
- Or
- (b) (i) Explain the definition, Concept and Classification of Smart Materials. (10)
- (ii) Explain the Thermo - Mechanical Properties (Shape Memory effect and Self- Healing effect) of Smart Materials. (10)