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Question Paper Code: 50781

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

ONE CREDIT COURSE

Mechanical Engineering

15UME861 - SMART MATERIALS

(Regulation 2015)

Duration: One hour

Maximum: 50 Marks

Answer ALL Questions

PART A - (30 x 1 = 30 Marks)

- Fiber glass is the _____ reinforced by glass fibers.
 - plastic matrix
 - polymeric matrix
 - metal matrix
 - fiber matrix
- Cemets is the composites of
 - cement and metals
 - ceramic and metal
 - cement and aesthetics
 - ceramic and fiber
- Particulate composites have one or more material particles suspended in a
 - metal matrix
 - polymer matrix
 - binding matrix
 - plastic matrix
- Concrete has Orientation of particle is _____ in all directions.
 - uniformly distributed
 - linear distributed
 - nonlinear distributed
 - randomly distributed
- Glass fiber tensile strength is _____ (GPa).
 - 3.5 to 4.6
 - 3.2
 - 4.6 to 5.0
 - 2.3
- Single layer composites has _____ reinforcement.
 - unidirectional
 - multi directional
 - randomized
 - non linear

7. Metallic glasses have the properties of more
 (a) weldability (b) ductility (c) strength (d) durability
8. Which one have high electrical conductivity
 (a) thermoelectric materials (b) thermoplastic materials
 (c) copper (d) steel
9. _____ compounds have combined properties of metal and nonmetals.
 (a) nonmetallic (b) bimetallic
 (c) Intermetallic (d) fiber
10. _____ which respond with a change in shape on the application of mechanical stress.
 (a) wooden materials (b) plastic materials
 (c) iron materials (d) smart materials
11. The word 'polymer' meant for material made from
 (a) Single entity (b) Two entities
 (c) Multiple entities (d) Any entity
12. In general, strongest polymer group is
 (a) Thermoplasts (b) Thermosets
 (c) Elastomers (d) All polymers
13. Kevlar is commercial name for
 (a) Glass fibers (b) Carbon fibers (c) Aramid fibers (d) Cermets
14. Strong covalent bonds exist between polymer chains in
 (a) Thermoplasts (b) Thermosets (c) Elastomers (d) All polymers
15. Following is the unique to polymeric materials:
 (a) Elasticity (b) Viscoelasticity (c) Plasticity (d) None of these
16. _____ can also be used to detect sound or movement.
 (a) polymers (b) metals
 (c) piezoelectric materials (d) thermoelectric materials
17. Piezo-electric materials are used in
 (a) transducer (b) load gauges (c) batteries (d) switches
18. Gallium arsenide V-I characteristics are similar to a
 (a) composites (b) metal matrix (c) semiconductor (d) fibers

19. Gallium arsenide was preferred materials for
- (a) aerospace (b) bio medicals
(c) Nano materials (d) solar cells
20. In superconductivity the conductivity of a material becomes
- (a) Zero (b) Finite (c) Infinite (d) None of these
21. In superconductors, the Fermi energy level is
- (a) Below the ground state
(b) Midway between the ground state and first excited state
(c) Above first excited state
(d) at first excited state
22. Which of the following are the properties of superconductors?
- (a) They are diamagnetic in nature (b) they have zero resistivity
(c) They have infinite conductivity (d) All the above
23. Intelligent material for achieving a desired response adaptable to the
- (a) work place (b) environment
(c) automotive (d) aerospace
24. Intelligent materials which sense any environmental change and respond to it in an
- (a) optical manner (b) electro manner
(c) eco-friendly (d) metal composites
25. Sensors used to
- (a) protect (b) sensing the signals
(c) observe dimensions (d) problem define
26. The Smart Control System will provide _____ for the sensors and actuators?
- (a) quality (b) condition (c) feedback control (d) signals
27. The $(\text{BN})_{1-x}(\text{C2})_x$ alloys are promising materials for band-gap engineering in
- (a) 1D electronics (b) 2D electronics
(c) 3D electronics (d) all the above
28. Nonlinear optical effects are manifested in the saturation of _____ and saturable absorbers.
- (a) laser amplifiers (b) electron beam
(c) thermostat (d) light waves

29. As a consequence, _____ can be seen as the interaction between electrical and mechanical systems.

(a) optical effect

(c) radiation material

(b) linier effect

(d) piezoelectricity

30. Thermochroic materials change reversibly colour with changes in

(a) pressure

(c) volume

(b) temperature

(d) density

PART - B (2 x 10 = 20 Marks)

31. (a) Discuss about Thermo-mechanical properties of smart materials. (20)

Or

(b) Explain in details of shape memory effect. (20)

32. (a) Explain in details of nonlinear optical effects and electro chromic. (20)

Or

(b) Explain about application of smart materials in sensors. (20)
