Model Question Paper ⁘ Basic Engineering and Sciences

1. The theorem used for equilibrium of concurrent coplanar forces is
   (1) Varignon's Theorem
   (2) Lame's Theorem
   (3) Parallel Axis Theorem
   (4) Perpendicular Axis Theorem

2. Tangential acceleration of the body moving with constant velocity on a curve is equal to
   (1) zero (2) V^2/R
   (3) R/V^2 (4) V/t
   where
   R = Radius of the curve
   T = time taken to turn on a curve

3. The path traced by the particle which thrown at an angle 'θ' with respect to horizontal is
   (1) straight line (2) parabola
   (3) triangle (4) ellipse

4. Frictional force depends on the
   (1) type of two surfaces in contact and normal reaction
   (2) material strength of the surfaces in contact
   (3) area of contact of the two surfaces
   (4) fracture toughness of the two materials in contact

5. How the area moment of inertia of the beam of rectangular cross-section can be increased?
   (1) Depth of the beam is greater than the width of the beam cross-section
   (2) Depth of the beam is equal to width of the beam cross- section
   (3) Depth of the beam is less than the width of beam cross-section
   (4) Cannot be increased

6. A mode of fracture that is attended by extensive plastic deformation is called
   (1) brittle fracture (2) ductile fracture
   (3) plastic fracture (4) fatigue fracture

7. The dimension of ferromagnetic domains is in the order of
   (1) 106m (2) 10–9m
   (3) 10–6m (4) 10–3m

8. The material in which spontaneous polarization changes with temperature is known as
   (1) Piezo electric (2) Ferro electric
   (3) Pyro electric (4) Magneto optic

9. Where K and σ are thermal and electrical conductivities in a solid, according to Wiedemann-Franz law
   (1) $\frac{KT}{\sigma}$ = constant (2) $\frac{K\sigma}{T}$ = constant
   (3) $\frac{\sigma}{KT}$ = constant (4) $\frac{K}{\sigma T}$ = constant

10. The dielectric constant of the commonly used ceramics varies between
    (1) 1 and 3 (2) 4 and 10
    (3) 11 and 16 (4) 16 and 25

11. The Reynolds number for a 25 mm diameter sphere moving with velocity of 3 m/s through an oil of specific gravity 0.90 and μ = 0.1 Pa.s. is
    (1) 675 (2) 6622
    (3) 66220 (4) 0.675

12. The maximum velocity divided by the average velocity in laminar Poisseuille flow between two parallel plates is
    (1) 2 (2) 1.5
    (3) 1.25 (4) 0.8

13. Boundary layer separation is caused by
    (1) Reduction of pressure in the flow direction
    (2) Presence of adverse pressure gradient
    (3) Presence of favourable pressure gradient
    (4) Reduction of boundary layer thickness

14. Principle of jet propulsion is utilized in
    (1) Car (2) Pump
    (3) Satellite (4) Ship

15. Specific speed Ns of a turbine is given by
    (1) $NP^{1/2}/H^{5/4}$ (2) $NP^{1/3}/H^{5/4}$
    (3) $(NP)^{1/2}/H^{5/4}$ (4) $(NP)^{1/3}/H^{5/4}$
    where
    N - is speed of turbine in rpm
    P - Power developed by turbine
    H - Head of water under which the turbine is working

16. The allowable BOD limit for the sewage irrigation as per the BIS is

(1) $\leq 100\,mg/L$ (2) $\leq 20\,mg/L$

(3) $\leq 500\,mg/L$ (4) $\leq 1000\,mg/L$

17. Ohm's Law is applicable to

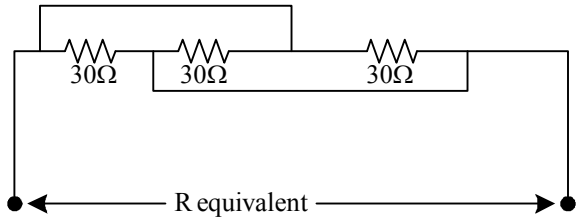
(1) Silicon carbide

(2) Zener diode

(3) Voltage regulator tubes

(4) Copper

18. R equivalent of the following circuit is



(1) 10Ω (2) 30Ω

(3) 90Ω (4) 0Ω

19. A wire of length L is having resistance R. If it is stretched to n times it's original length, the resistance of stretched wire is

(1) R (2) nR

(3) $\frac{R}{n^2}$ (4) $n^2 R$

20. Bridge that is used for two resistance measurement is

(1) Wheatstone bridge (2) Kelvin's double bridge

(3) Maxwell's bridge (4) Anderson's bridge

21. In a transformer on no load, the input voltage

(1) Leads the magnetizing current by 90°

(2) Lags the magnetizing current by 90°

(3) Is in phase with the magnetizing current

(4) Is always at 45° to the magnetizing current

22. If the dimensions of all the parts of a synchronous generator, and the number of field and armature turns are doubled, then the generated voltage will change by a factor of

(1) 1 (2) 2

(3) 4 (4) 8

23. The constant volume specific heat is given by

(1) $\left(\frac{\partial h}{\partial T}\right)_{v=c}$ (2) $\left(\frac{\partial u}{\partial T}\right)_{v=c}$

(3) $\left(\frac{\partial E}{\partial T}\right)_{v=c}$ (4) $\left(\frac{\partial S}{\partial T}\right)_{v=c}$

24. Zeroth law of thermodynamics postulate

(1) Thermodynamic equilibrium

(2) Heat equilibrium

(3) Temperature equilibrium

(4) Thermal equilibrium

25. In steady flow energy equation the state of the energy at each point in the control volume vary with the time requires

(1) $\frac{dm_{c.v}}{dt} = 0$ (2) $\frac{dE_{c.v}}{dt} = 0$

(3) $\frac{dm}{dT} = 0$ (4) $\frac{dE}{dT} = 0$

26. In a nozzle flow in thermodynamics

(1) M = 0 (2) W = 0

(3) E = 0 (4) V = 0

27. Clausius in-equality is applicable for

(1) Heat engines (2) Heat generators

(3) Refrigerators (4) Cooling towers

28. Convert 0.9375 to binary

(1) 0.0111 (2) 0.1011

(3) 0.1111 (4) none

29. $(1a00 * 10b)/1010 = 100$

(1) a = 0, b = 0 (2) a = 0, b = 1

(3) a = 1, b = 0 (4) a = 1, b = 1

30. Find the output for the following C program ( )

```
{
char*p1="Name";
char*p2;
p2=(char*)malloc(20);
while(*p2++=*p1++);
printf("%s\n",p2);
}
```

(1) Empty String (2) Name

(3) Name \\\ (4) Error

31. Find the output for the following C program main ( )

```
{
int x=5;
printf("%d %d %d\n", x, x<<2, x>>2);
}
```

(1) 5 20 1 (2) 5 10 2

(3) 5 20 5 (4) 5 10 1

32. From the following four choices, find the odd man out
(1) INTEL (2) MOTOROLA
(3) NEC (4) IBM

33. From the following four choices, find the odd man out with reference to computer terminology
(1) ROM (2) PROM
(3) EPROM (4) EEPROM

34. If the lattice constants a, b, c are such that $a = b \neq c$ and the angles between them $\alpha = \beta = 90°$, $\gamma = 120°$, then the crystal structure is
(1) Hexagonal (2) Tetragonal
(3) Trigonal (4) Triclinic

35. In radiography *x*–rays are used because *x*–rays
(1) get diffracted inside the object through which it penetrates
(2) are differentially absorbed by the inhomogenity of the material through which it passes.
(3) produce heat effect
(4) are harmless radiation

36. In a double slit interference experiment when the distance between the slits is made three folds, the fringe width becomes
(1) $\frac{1}{3}$ folds (2) 3 folds
(3) 9 folds (4) $\frac{1}{9}$ folds

37. The idea of the quantum nature of light is required to explain
(1) interference of light
(2) thermionic emission
(3) Radioactivity
(4) Blackbody radiation

38. The wavelength of emission from He-Ne laser is
(1) 10.64 μm (2) 337.1 *nm*
(3) 694.3 *nm* (4) 632.8 *nm*

39. An optical fibre has a core material of refractive index of 1.55 and cladding material of refractive index of 1.50. The numerical aperture of the fibre is
(1) 0.05 (2) 0.39
(3) 3.05 (4) 0.90

40. Which of the following statements regarding the adsorption of a gas on a solid is correct?
i. The amount of gas adsorbed increases with increase in pressure
ii. The amount of gas adsorbed increases with increase in temperature
iii. The amount of gas adsorbed increases with increase in the area of the adsorbent
(1) i and ii (2) i and iii
(3) ii and iii (4) i, ii and iii

41. The increasing order of adsorption power of adsorbants is given by
(1) alumina > silica gel > magnesia > calcium carbonate
(2) calcium carbonate > magnesia > silica get > alumina
(3) magnesia > calcium carbonate > alumina > silica gel
(4) silica gel > magnesia > calcium carbonate > alumina

42. Which of the following statements is true?
i. For a first order reaction the half time is directly proportional to the rate constant
ii. In a zero order reaction the rate does not change with time
iii. Molecularity is always a whole number and it cannot be zero
(1) i and ii (2) i and iii
(3) ii and iii (4) i, ii and iii

43. Which of the following relations are wrong?
i. The specific conductance is given by the relation $k = \frac{1}{R}(l/A)$
ii. The equivalent conductance is given by the relation $\lambda = \frac{100K}{C}$
iii. The specific resistance is given by the relation $\rho = \frac{Rl}{A}$
(1) i and ii (2) i and iii
(3) ii and iii (4) ii only

44. The regions of electromagnetic spectrum given in terms of wave length for Microwave, Visible and Mid. IR spectroscopy are given respectively by
(1) 1–100 mm, 2.5 – 50 m μ and 380 –780 nm
(2) 2.5–50 m μ , 1–100 mm and 380–780 nm
(3) 380–780 nm, 2.5 – 50 m μ and 1–100 mm
(4) 1–100 mm, 380–780 nm and 2.5 –50 m μ

45. The increase in order of carbon content of the different types of coal is given by
(1) Peat < Sub-bituminous coal < Bituminous coal < Anthracite
(2) Peat < Bituminous coal < Sub-bituminous coal < Anthracite
(3) Anthracite < Sub-bituminous coal < Binuminous coal < Peat
(4) Anthracite < Bituminous coal < Sub-bituminous coal < Peat

Basic Engineering and Sciences : Answers

1. 2	16. 3	31. 2
2. 1	17. 4	32. 2
3. 2	18. 1	33. 4
4. 1	19. 2	34. 1
5. 1	20. 1	35. 1
6. 4	21. 2	36. 1
7. 3	22. 1	37. 4
8. 3	23. 2	38. 1
9. 4	24. 4	39. 2
10. 3	25. 2	40. 4
11. 4	26. 2	41. 1
12. 4	27. 1	42. 3
13. 2	28. 1	43. 3
14. 3	29. 4	44. 1
15. 1	30. 4	45. 1

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