MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

I B.TECH I SEMESTER MR15 Regulations

Subject: Applied Physics – I (Common for all branches)

II Mid Question Bank

Module: III:

1. An Ultrasonic wave is basically [ ]
   a) A magnetic wave
   b) An electromagnetic wave
   c) An inaudible sound
   d) A heat wave
2. Seawater is a dissipative medium through viscosity and chemical processes. How does this affect underwater acoustic propagation? [ ]
   a) It does not affect the acoustic signals
   b) It causes frequency independent absorption of the acoustic signals
   c) It causes frequency dependent absorption of the acoustic signals such that higher frequencies will reach longer
   d) It causes frequency dependent absorption of the acoustic signals such that lower Frequencies will reach longer
3. Non Destructive Testing is a technique used for detecting [ ]
   a) Cracks in metals and concrete slabs
   b) Mechanical strength of concrete slabs
   c) Brittleness of glass
   d) Tensile strength of a body
4. ________ metal is used in Thermal detector method of detecting the ultrasonics.
   a) Gold b) Silver c) Copper d) Platinum [ ]
5. Magnetostriction effect is used for producing [ ]
   a) Electric field
   b) Ultrasonic waves
   c) Change in temperature of a magnetic material
   d) None of these
6. A magnetostriction oscillator needs [ ]
   a) An oscillator
   b) A current amplifier
   c) A magnetostriction coil
   d) All of the above

7. Magnetostriction ultrasonic generators are generally used at [ ]
   a) Lower frequencies for higher power outputs
   b) Higher frequencies for higher power outputs
   c) Lower frequencies for lower power outputs
   d) Higher frequencies for lower power outputs
8. As an ultrasound pulse moves through tissue in a patient's body it will undergo a change in:
   a) Frequency and velocity [ ]
   b) Amplitude
   c) Intensity
   d) Both b and c
9. The piezoelectric phenomenon is observed in a [ ]
   a) Nickel rod
   b) NaCl crystal
   c) Quartz crystal
   d) Iron rod
10. Ultrasonic waves cannot be produced by [ ]
    a) Radio frequency oscillator with diaphragm loudspeaker
    b) Radio frequency oscillator with quartz crystal
    c) Radio frequency oscillator with nickel rod
    d) All of the above
11. Which one from the following is a correct characteristic of ultrasonic waves?
    a) Ultrasonics are sound waves of very long wavelength [ ]
    b) Ultrasonics are sound waves of very high frequency
    c) Ultrasonic waves are audible
    d) Ultrasonic waves are absorbed by the sea water
12. The defects in welded, casted, and forged materials can be detected without spoiling them by _____of materials [ ]
    a) Destructive testing
    b) Magnetostrictive testing
    c) Non destructive testing
    d) All of the above
13. Ultrasonic methods of testing is used to find [ ]
    a) Cracks
    b) Voids

c) Foreign material inclusions

d) All the above

14. Waves used in ultrasonic testing of materials are ________ in nature. [ ]

a) mechanical b) magnetic c) electromagnetic d) harmonious

15. Particle motion in a longitudinal wave is [ ]

a) Parallel to the direction of wave propagation

b) At right angles to the direction of wave propagation

c) Retrograde

d) In counterclockwise ellipses

16. The fundamental frequency of a piezoelectric crystal used in ultrasonics is a function of:

a) Its thickness b) its density c) both a and b d) None of the above. [ ]

17. The smallest distance between two points on a wave where the particles are in the same state of motion is ________ [ ]

a) Period b) wavelength c) frequency d) hypotenuse

18. In ultrasound scanning (sonography) a piezoelectric material is used to [ ]

a) Convert electric energy to mechanical energy

b) Convert mechanical energy to electrical energy

c) Both a and b

d) None of the above

19. In the hexagonal base of the quartz crystal the imaginary lines joining the opposite corners form ________ axes. [ ]

a) X b) Y c) Z d) none of these

20. Attenuation of an ultrasonic wave propagated through material can be attributed to:

a) Absorption.

b) Diffraction.

c) Scattering.

d) all of the above. [ ]

21. The principle used for the production of ultrasonic waves is [ ]

a) photoelectric effect b) Inverse piezoelectric effect

c) Hall effect d) Compton effect

22. Ultrasonic waves can be sensed by [ ]

a) human beings b) dogs c) both (a) and (b) d) none of these

23. Ultrasonic waves are detected by [ ]

a) a telephone b) Quincle's method

c) Kundt's method d) Hebbe's method

24. Which of the following statements is true? [ ]

a) Ultrasonic waves have the frequency ranging from 20 Hz to 20 KHz

b) Bats can sense the ultrasonic waves

c) Human ear is sensitive to ultrasonic wave

d) Ultrasonic waves are low – frequency waves.

25. Which among the following magnetic materials are usually capable of exhibiting magnetostriction effect? [ ]

a) Dia b) Para c) Ferro d) none of thes

Module-3 Key

1	c	13	d
2	c	14	a
3	a	15	a
4	d	16	c
5	b	17	b
6	d	18	c
7	a	19	a
8	d	20	d
9	c	21	b
10	a	22	b
11	b	23	c
12	c	24	b
		25	c

Module IV:

1. In Simple Harmonic Motion, restoring force is always directed ______ the equilibrium position [ ]

   a)Towards b) away from c) above d) below

2. The maximum displacement from the equilibrium position is called [ ]

   a)Frequency b) period c) amplitude d) none of these

3. _______ force is involved in free oscillations. [ ]

   a) resisting b) restoring c) pseudo d) none of these

4. _______ force is also involved in damped oscillations. [ ]

a) resisting b) restoring c) pseudo d) none of these

5. Restoring force is _____ proportional to the displacement. [ ]

a) directly b) inversely c) exponential d) none of these

6. Restoring force and displacement act in the _______ direction. [ ]

a) same b) opposite c) perpendicular d) none of these

7. Number of oscillations made by the vibratory body per unit time is called [ ]

a)Frequency b) period c) amplitude d) none of these

8. Velocity of a particle executing S.H.M is maximum at [ ]

a) equilibrium position b) extreme position

c) intermediate position d) cannot be predicted.

9. Vibrations made by the body in absence of frictional force or resistance are___ vibrations. [ ]

a) free b) damped c) forced d) none of these.

10. The energy of an oscillator is proportional to ________of its amplitude. [ ]

a) square b) square root c) cube d) cube root

11. The acceleration of a particle executing S.H.M is zero at ______position [ ]

a) equilibrium position b) extreme position

c) intermediate position d) cannot be predicted.

12. The frequency (f) of an oscillator executing free oscillations is given by f =[ ]

a) $\frac{1}{2\pi}\sqrt{\frac{k}{m}}$ b) $\frac{1}{2\pi}\sqrt{\frac{m}{k}}$ c) $2\pi\sqrt{\frac{k}{m}}$ d) $2\pi\sqrt{\frac{m}{k}}$

13. The Time period (T) of an oscillator executing free oscillations is given by T =

a) $\frac{1}{2\pi}\sqrt{\frac{k}{m}}$ b) $\frac{1}{2\pi}\sqrt{\frac{m}{k}}$ c) $2\pi\sqrt{\frac{k}{m}}$ d) $2\pi\sqrt{\frac{m}{k}}$ [ ]

14. Time required for the execution of a complete to – and – fro motion is called [ ]

a) Time period b) drift time c) relaxation time d) none of these

15. The parameter that is 90^0 out of phase with the displacement is ________ [ ]

a) Time period b) Velocity c) acceleration d) none of these

16. The parameter that is 180^0 out of phase with the displacement is _______. [ ]

a) Time period b) Velocity c) acceleration d) none of these

17. Potential energy of a particle executing S.H.M is maximum at __________ position.

a) equilibrium position b) extreme position

c) intermediate position d) cannot be predicted. [ ]

18. Kinetic energy of a particle executing S.H.M is maximum at ___________ position.

a) equilibrium position b) extreme position

c) intermediate position d) cannot be predicted. [ ]

19. Velocity of the particle executing S.H.M is zero at _________ position. [ ]

a) equilibrium position b) extreme position

c) intermediate position d) cannot be predicted.

20. The acceleration of a particle executing S.H.M is maximum at ______position

a) equilibrium position b) extreme position

c) intermediate position d) cannot be predicted. [ ]

21. The amplitude of a body executing Free oscillations ________ with time [ ]

a) increases b) decreases c) remains constant d) cannot be predicted

22. As the particle executing free oscillations, displaces from the mean position, the total energy _____________ [ ]

a) increases and then decreases b) decreases and then increases

c) remains constant d) none of these

23. Lissajous figure corresponding to the superposition of two SHMs with the phase difference of 0^0 is [ ]

a) straight line b) oblique ellipse c) ellipse d) circle

24. Lissajous figure corresponding to the superposition of two SHMs with the phase difference of 45^0 is [ ]

a) straight line b) oblique ellipse c) ellipse d) circle

25. Lissajous figure corresponding to the superposition of two SHMs with the phase difference of 90^0 is [ ]

a) straight line b) oblique ellipse c) ellipse d) circle

26. Lissajous figure corresponding to the superposition of two SHMs with the phase difference of 90^0 and equal amplitude is [ ]

a) straight line b) oblique ellipse c) ellipse d) circle

27. Damped vibrations are of ________ types [ ]

a) 1 b) 2 c) 3 d) 4

28. Resisting force is _____ proportional to the velocity. [ ]

a) directly b) inversely c) exponential d) none of these

29. Resisting force and velocity act in the _______ direction. [ ]

a) same b) opposite c) perpendicular d) none of these

30. $b^2 < {\omega_0}^2$ is the condition for ____________ vibrations. [ ]

a) under damped b) over damped

c) critical damped d) none of these

31. $b^2 > {\omega_0}^2$ is the condition for ____________ vibrations. [ ]

a) under damped b) over damped

c) critical damped d) none of these

32. $b^2 = {\omega_0}^2$ is the condition for ____________ vibrations. [ ]

a) under damped b) over damped

c) critical damped d) none of these

33. Mechanical resistance is independent of the __________ of the applied force.

a) amplitude b) frequency c) magnitude d) none of these. [ ]

34. The mechanical equivalent of charge is [ ]

a) Displacement b) Velocity c) acceleration d) none of these

35. When a body is subjected to external force, ______ vibrations are developed.[ ]

a) free b) damped c) forced d) none of these

36. The phenomenon of making a body vibrate with maximum amplitude under the influence of another vibrating body with the same frequency of vibration is called___[ ]

a) damping b) resonance c) over damping d) critical damping

37. The rate of fall in amplitude, with the change of forcing frequency on each side of resonant frequency is called ___________ [ ]

a) sharpness b) resonance c) over damping d) critical damping

38. Resonance in the case of very high damping factor is ______________ [ ]

a) very high b) flat c) varies linearly d) unaffected.

39. When damping factor is zero, the amplitude is __________ [ ]

a) zero b) infinity c) finite d) none of these.

40. The electrical equivalent of mass is ______________ [ ]

a) capacitance b) resistance c) inductance d) none of these

41. The electrical equivalent of force constant is__________ [ ]

a) capacitance b) reciprocal of capacitance

c) inductance d) reciprocal of inductance

42. The mechanical equivalent of current is ________ [ ]

a) acceleration b) rate of change of current c) velocity d) none of these

43. Electrical impedance in LCR series circuit is the collective opposition offered to flow of current by ________, capacitor and resistor. [ ]

a) diode b) transistor c) Inductor d) none of these

44. Electrical resistance is independent of the __________ of the applied field [ ]

a) amplitude b) frequency c) magnitude d) none of these.

45. Reactance is dependent on the __________ of the applied field [ ]

a) amplitude b) frequency c) magnitude d) none of these.

46. Logarithmic decrement measures the rate of decay of ________________ [ ]

a) frequency b) time period c) amplitude d) none of these

47. The time required for the mechanical energy to decay to (1/e) of its initial value is called

a) Time period b) drift time c) relaxation time d) none of these [ ]

48. ________ electric field is applied in LCR series resonant circuit [ ]

a) DC b) AC c) DC or AC d) none of these

49. Potential energy of a particle executing S.H.M is minimum at __________ position.

a) equilibrium position b) extreme position

c) intermediate position d) cannot be predicted. [ ]

50. Kinetic energy of a particle executing S.H.M is minimum at ___________ position.

a) equilibrium position b) extreme position

c) intermediate position d) cannot be predicted. [

Module-4 Key:

1	**a**	17	**b**	33	**B**
2	**c**	18	**a**	34	**A**
3	**b**	19	**b**	35	**C**
4	**a**	20	**b**	36	**B**
5	**a**	21	**c**	37	**A**
6	**b**	22	**c**	38	**B**
7	**a**	23	**a**	39	**B**
8	**a**	24	**b**	40	**C**
9	**a**	25	**c**	41	**B**
10	**a**	26	**d**	42	**c**
11	**a**	27	**c**	43	**c**
12	**a**	28	**a**	44	**b**
13	**d**	29	**b**	45	**b**
14	**a**	30	**a**	46	**c**
15	**b**	31	**b**	47	**c**
16	**c**	32	**c**	48	**b**
				49	**a**
				50	**b**

Module-V

1. In which statistics, the particles are distinguishable [ ]
   (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) All
2. In which statistics, the particles are indistinguishable [ ]
   (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c
3. The following come under Classical statistics [ ]
   (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c
4. The following come under Quantum statistics [ ]
   (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c
5. The particles, which follows the Bose-Einstein statistics, are known as [ ]
   (a) Bosons (b) Fermions (c) Photons (d) Phonons
6. The particles, which follows the Fermi-Dirac statistics, are known as [ ]
   (a) Bosons (b) Fermions (c) Photons (d) Phonons
7. Maxwell-Boltzmann statistics deals with________ spin particles [ ]
   (a) Any spin (b) Integral spin (c) Half integral spin (d) None
8. Bose-Einstein statistics deals with________ spin particles [ ]
   (a) Any spin (b) Integral spin (c) Half integral spin (d) None
9. Fermi-Dirac statistics deals with________ spin particles [ ]
   (a) Any spin (b) Integral spin (c) Half integral spin (d) None
10. Statistics which deals with the continuous energy levels is [ ]
    (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c
11. Example for Maxwell-Boltzmann statistics [ ]
    (a) Gas molecules (b) Electrons (c) Protons (d) Photons
12. Example for Bose-Einstein statistics [ ]
    (a) Gas molecules (b) Electrons (c) Protons (d) Photons
13. Example for Fermi-Dirac statistics [ ]
    (a) Photons (b) Electrons (c) Protons (d) b & c
14. Statistics which deals with the discrete energy levels is [ ]
    (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c
15. Statistics which only obeys the Pauli's exclusion principle is [ ]
    (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c
16. Statistics which permits only one particle in a energy state [ ]
    (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c
17. The wave functions of particles in______ statistics do not overlap [ ]
    (a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both a & b

18. The wave functions of particles are _______ in Bose-Einstein statistics [ ]

(a) Symmetric (b) asymmetric (c) both a & b (d) None

19. The wave functions of particles are _______ in Fermi-Dirac statistics [ ]

(a) Symmetric (b) asymmetric (c) both a & b (d) None

20. The Statistical Mechanics deals with the ______ behaviour of the system [ ]

(a) Probable (b) Exact (c) More accurate (d) None

21. The distribution of light particles can be explained using [ ]

(a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c

22. The distribution of electrons in a conductor can be explained using [ ]

(a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c

23. The Plank's law is [ ]

(a) E = nhυ (b) E = hυ (c) E = kT (d) E = mvr

24. The Rayleigh-Jean's law is [ ]

(a) $E_\lambda = 8\pi kT/\lambda^4$ (b) $E_\lambda = 8\pi hc\lambda^{-5}\exp(-hc/\lambda kT)$ (c) $E\lambda d\lambda = \left[\frac{8\pi hc}{\lambda^5}\right]\left[\frac{1}{\exp\left[\frac{ch}{\lambda kT}\right]-1}\right]d\lambda$

(d) None

25. The Photon energy density using Plank's law [ ]

(a) $E_\lambda = 8\pi kT/\lambda^4$ (b) $E_\lambda = 8\pi hc\lambda^{-5}\exp(-hc/\lambda kT)$ (c) $E\lambda d\lambda = \left[\frac{8\pi hc}{\lambda^5}\right]\left[\frac{1}{\exp\left[\frac{ch}{\lambda kT}\right]-1}\right]d\lambda$

(d) None

26. The Wien's law [ ]

(a) $E_\lambda = 8\pi kT/\lambda^4$ (b) $E_\lambda = 8\pi hc\lambda^{-5}\exp(-hc/\lambda kT)$ (c) $E\lambda d\lambda = \left[\frac{8\pi hc}{\lambda^5}\right]\left[\frac{1}{\exp\left[\frac{ch}{\lambda kT}\right]-1}\right]d\lambda$

(d) None

27. Maxwell-Boltzmann distribution function is [ ]

(a) $f_{MB}(E) = A/\exp(-E_i/kT)$ (b) $f_{BE}(E) = \frac{1}{\exp\left(\frac{E_F - E_i}{kt}\right)-1}$

(c) $f_{FD}(E)=\dfrac{1}{\exp\left(\dfrac{E_F-E_i}{kt}\right)+1}$ (d) None

28. Bose-Einstein distribution function is [ ]

(a) $f_{MB}(E) = A/\exp(-E_i/kT)$ (b) $f_{FD}(E)=\dfrac{1}{\exp\left(\dfrac{E_F-E_i}{kt}\right)+1}$

(c) $f_{BE}(E)=\dfrac{1}{\exp\left(\dfrac{E_F-E_i}{kt}\right)-1}$ (d) None

29. Fermi-Dirac distribution function is [ ]

(a) $f_{MB}(E) = A/\exp(-E_i/kT)$ (b) $f_{BE}(E)=\dfrac{1}{\exp\left(\dfrac{E_F-E_i}{kt}\right)-1}$

(c) $f_{FD}(E)=\dfrac{1}{\exp\left(\dfrac{E_F-E_i}{kt}\right)+1}$ (d) None

30. The Wien's radiation law is applicable for __________wavelengths [ ]

(a) Shorter (b) Longer (c) For all wavelengths (d) None

31. The Rayleigh-Jean's law is applicable for __________wavelengths [ ]

(a) Shorter (b) Longer (c) For all wavelengths (d) None

32. Consider four particles (a, b, c & d) are to be distributed in cell x & cell y such that there are three particles in cell x while one particle in cell y. Then the number of possible ways according to Maxwell-Boltzmann statistics is [ ]

(a) 6 (b) 4 (c) 3 (d) 1

33. Consider four particles (a, b, c & d) are to be distributed in cell x & cell y such that there are three particles in cell x while one particle in cell y. There are four micro cells in each macro cell. Then the number of possible ways according to Bose-Einstein statistics is [ ]

(a) 20 (b) 4 (c) 80 (d) 12

34. Consider four particles (a, b, c & d) are to be distributed in cell x & cell y such that there are three particles in cell x while one particle in cell y. There are four micro cells in each macro cell. Then the number of possible ways according to Fermi-Dirac statistics is [ ]

(a) 20 (b) 4 (c) 16 (d) 12

35. The statistics deals with phonons in a solid is [ ]

(a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c

36. The highest level of filled energy state at non zero Kelvin temp, which the probability of electron occupation is ½, is known as [ ]

(a) Fermi level (b) Bose condensation (c) Dirac level (d) All these

37. The He atoms at low temperatures follows the ______________statistics [ ]

(a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c

38. At non zero Kelvin temperature, the highest electron occupied level is [ ]

(a) Fermi level (b) Bose condensation (c) Dirac level (d) All these

39. The body, which absorbs the total radiation incidents on it and emits the total radiation, is called [ ]

(a) White body (b) Black body (c) Colour body (d) None of these

40. Quantum numbers n_x, n_y, n_z define the state of the ____ [ ]

(a) Particle (b) Wave (c) Both (d) None

41. The combination of both position and momentum space is called [ ]

(a) Phase space (b) Empty space (c) Full space (d) None of these

42. Maxwell-Boltzmann statistics do not obey _______principle [ ]

(a) Pauli's exclusion (b) Archimedes (c) Newton's (d) None of these

43. Bose-Einstein statistics do not obey _____________principle [ ]

(a) Pauli's exclusion (b) Archimedes (c) Newton's (d) None of these

44. Fermi energy level is the energy of the state at which the probability of electron occupation is ____________at any temperature above 0K [ ]

(a) 1 (b) 0 (c) 0.5 (d) Any value in between 1 and 0

45. The volume of the cell in phase space can't be less than [ ]

(a) h^3 (b) h^5 (c) h^6 (d) h

46. In the Fermi function, at T = 0 and $E<E_f$ then F(E) is [ ]

(a) 1 (b) 0 (c) 0.5 (d) Any value in between 1 and 0

47. In the Fermi function, at T = 0 and $E>E_f$ then F(E) is [ ]

(a) 1 (b) 0 (c) 0.5 (d) Any value in between 1 and 0

48. At higher energies, Bose-Einstein approaches to ____ [ ]

(a) Maxwell-Boltzmann (b) Fermi-Dirac (c) Both (d) None

49. Black body radiation is explained using [ ]

(a) Maxwell-Boltzmann (b) Bose-Einstein (c) Fermi-Dirac (d) both b & c

50. According to the Planck, the _____ is quantized in the black body radiation [ ]

(a) Energy (b) Power (c) Angular momentum (d) Force

Module-5 Key:

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