VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
(Autonomous & Residential)
[Affiliated to Madurai Kamaraj University]
B.Sc. Maths & Chem. Degree (Semester) Examinations, April 2020
Part – III : Allied Subject : Second Semester : Paper – I

ALLIED PHYSICS – II
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. The points in the consecutive slits separated by the distance is
   a) a / b   b) a× b   c) a + b   d) a - b

2. In an _____ pattern, all the maxima are of same intensity
   a) polarization   b) refraction   c) interference   d) diffraction

3. The magentic quantum number (m) refers to
   a) Sublevel or shape of the orbital the electron is in
   b) direction of electron spin   c) Energy level the electron is in
   d) orientation of orbital's around nucleus

4. The electronic configuration of the alkali metals Li (Z=3)
   a) $1S^2\ 2S^1$ b) $1S^1\ 2S^2$ c) $1S^1\ 2S^1$ d) $1S^2\ 2S^2$

5. The ionization chamber contains some gas like sulphur dioxide or
   a) oxygen   b) methyl bromide   c) nitrogen   d) chlorine

6. For the fusion to take place, the component nuclei must be brought to
   within a distance of
   a) 10^{-10} cm   b) 10^{-2} cm   c) 10^{-11} cm   d) 10^{-12} cm

7. What two principles make up the theory of special relativity?
   a) Principle of nuclear forces and the principle of the speed of light
   b) Principle of relativity and the principle of mass
   c) Principle of mass and the principle of nuclear forces
   d) Principle of relativity and the principle of the speed of light

8. If 4kg of a substance is fully converted into energy, how much energy is produced?

   a) 3.6×10^{17} J   b) 2.6×10^{17} J   c) 3.6×10^{10} J   d) 3.6×10^{-17} J

9. The basic logic gate whose output is the complement of the input is the

   a) AND   b) OR   c) Inverter   d) comparator

10. The only function of NOT gate is to _____

   a) stop a signal   b) invert input signal

   c) act as a universal gate   d) none of the above

SECTION – B

Answer any FIVE Questions :   **(5 $\times$ 2 = 10)**

11. What is diffraction?

12. What are the two concepts of vector atom model?

13. What is mass defect in the case of nucleus?

14. What is nuclear fusion?

15. What do you mean by length contraction?

16. What is the truth table of NAND gate?

17. What are the OR Laws of Boolean Algebra.

SECTION – C

Answer ALL Questions :   **(5 $\times$ 5 = 25)**

18. a) Differentiate between interference and diffraction.

                    (OR)

    b) A parallel beam of sodium light $\left(\lambda = 589 \times 10^{-9} m\right)$ is incident on a thin

    glass plate $(n = 1.5)$ such the angle of refraction in to the plate is 60°.

    Calculate the smallest thickness of the plate which will make it appear

    dark by reflection.

19. a) Explain the principle and working of stern and Gerlach experiment.

                    (OR)

    b) State and explain Pauli's exclusion principle.

20. a) Distinguish between fission and fusion.

                    (OR)

    b) Calculate the binding energy of an $\propto$ - particle and express the result

      both in Mev and joules.

21. a) Derive the expression for time dilation

                    (OR)

    b) How fast would a rocket have to go relative to an observes for its

    length

      to be contracted to 99% of its length at rest?

22. a) Describe an experiment to obtain voltage current characteristics of a

      zener diode with neat circuit diagram.

                    (OR)

    b). Prove that $\left(A+B\right)\left(A+\overline{B}\right)\left(\overline{A}+C\right) = AC$.

SECTION – D

Answer any THREE Questions :   **(3 $\times$ 10 = 30)**

23. Describe the construction and working of a half –shade polarimeter.

24. Describe various quantum numbers associated with vector atom model.

25. Describe briefly the working of a nuclear reactor?

26. Derive Einstein's mass- energy relation.

27. State and prove Demorgan's theorems.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – III : Core Subject : Second Semester : Paper – I
THERMODYNAMICS AND STATISTICAL MECHANICS
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. The efficiency of Carnot's engine working between 127 ˚C and 27 ˚C is:

   a) 25%   b) 50%   c) 75%   d) 100%

2. At constant temperature, (U being the internal energy)

   a) U change when V or P changes

   b) U does not change when V or P changes

   c) U does not change when T changes

   d) Uis not a function of temperature

3. Which of the following has least value of thermal conductivity

   a) glass   b) water   c)air   d) plastic

4. The unit of Stefan-Boltzmann constant is

   a) Watt $m^{-2}K^{-4}$ b) Watt mK^{-1} c) Watt mK^{-4} d) Watt $m^{2}K^{-4}$

5. When a gas undergoes continuous throttling process by a valve and its pressure and temperature are plotted, then we get a

   a) isotherm   b) isenthalpe   c) adiabatic   d) isobar

6. According to Van der Waal's gas equation, critical coefficient RT_c/P_cV_c is equal to

   a) 8   b) 3   c) 3/8   d) 8/3

7. In the special rule of multiplication of probability, the events must be

   a) independent   b) mutually exclusive   c) Bayesian   d) empirical

8. The average speed of gas molecules varies with temperature as $\bar{v} \propto T^n$, the value of n is

   a) 0   b) 1/2   c) 2   d) 1/3

9. According to F-D statistics, number of ways 3 particles can be distributed in 4 energy states is

   a) 16   b) 4   c) 9   d) 12

10. Fermi energy E_F depends on

    a) size of the conductor   b) volume of the conductor

    c) electron concentration of the conductor

    d) electrical resistance of the conductor

SECTION – B
Answer any FIVE Questions :   **(5 × 2 = 10)**

11. State the first law of thermodynamics.

12. Write the effective way to increase the efficiency of Carnot's engine.

13. How can you define coefficient of thermal conductivity?

14. Define solar constant.

15. Define Probability.

16. What is Entropy?

17. Write the sterling approximation theorem?

SECTION – C
Answer ALL Questions :   **(5 × 5 = 25)**

18. a) Prove that the work done along any adiabatic between two isothermals is independent of the particular adiabatic.

   (OR)

   b) Find the efficiency of a Carnot's engine working between 127ºC and 27ºC; it absorbs 80 cals of heat. How much heat rejected.

19. a) Explain the distribution of energy in black body spectrum.

   (OR)

   b) The opposite faces of a metal plate of 0.2 cm thickness are at a difference of temperature of $100^{o}c$ and the area of the plate is 200sq cm. Find the quantity of heat that will flow through the plate in one minute if K = 0.2 CGS units.

20. a) Discuss briefly about the carnot cycle.

   (OR)

   b) State and explain equipartition energy.

21. a) Give the additive law of probability.

   (OR)

   b) An Urn contains 4 black and 3 white balls. What is the probability that on two successive draws, the balls drawn are both black?

22. a) State and explain Zeroth Law of thermodynamics.

   (OR)

   b) A card is drawn from a well shuffled pack of 52 cards. Calculate the probability for this card to either king or queen.

SECTION – D
Answer any THREE Questions :   **(3 × 10 = 30)**

23. State and prove Carnot's theorem.

24. Demonstrate how the absolute conductivity of metals are determined by Forbe's method.

25. Explain Maxwell Boltzmann energy distribution law.

26. State and prove the Boltzmann's theorem between entropy and probability.

27. Compare the three statistics.

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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – III : Core Subject : Second Semester : Paper – II

OPTICS AND SOUND
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. A device that can be used to measure change in length with great accuracy by means of interference fringes.

   a) Polarimeter   b) Interferometer   c) microscope   d) spectrometer

2. The similarity between the sound waves and light waves is

   a) both are electromagnetic waves   b) both are longitudinal waves

   c) both have same speed in a medium   d) they can produce interference

3. A photograph of an interference pattern in three dimensional images is called _____

   a) pixel   b) Hologram   c) holography   d) bar code

4. Which property of light is confirmed by diffraction?

   a) Particle nature   b) Transverse wave nature

   c) Longitudinal wave nature   d) Wave nature

5. If plane polarized light with its vibrations making an angle of 45º with the optic axis, passed through a quarter wave plate, the emergent light is _____

   a) Linearly polarized   b) plane polarized

   c) circularly polarized   d) elliptically polarized

6. Brewster's angle is when

   a) reflected light is completely polarised light

   b) reflected light is partially polarized

   c) no light is reflected

   d) angle between incident and reflected light is 90 degrees

7. In simple harmonic motion the average kinetic energy during one period is exactly equal to _____

   a)average potential energy   b) average kinetic energy

   c) average pressure energy   d) none of the above

8. In damped harmonic oscillation which one decreases?

   a) amplitude of vibration   b) energy of vibration

   c) both amplitude and energy   d) neither amplitude nor energy

9. In fluids, sound waves are _____

   a) Longitudinal   b) transverse c) resonance   d) frequency

10. Sound and light waves both

   a) have similar wavelength   b) obey the laws of reflection

   c) travel as longitudinal waves   d) travel through vacuum

SECTION – B

Answer any FIVE Questions :   **(5 × 2 = 10)**

11. Define the term constructive interference.

12. What is an interferometer?

13. Define resolving power of the grating.

14. Write about X-ray.

15. What is called polaroid?

16. Define the term Coherence.

17. Define Polarization.

SECTION – C

Answer ALL Questions :   **(5 × 5 = 25)**

18. a) Derive the relation for relativistic Doppler effect.

                (OR)

   b) Fringes of equal inclination are observed in a Michelson interferometer. As one of the mirrors is moved back by 1 mm, 3663 fringes move out from the centre of the pattern. Calculate λ.

19. a) Write a note on holography.

                (OR)

   b) In a plane transmission grating,the angle of diffraction for the second order principal maximum for the wavelength 5×10^{-5} cm is 30°. Calculate the number of lines in one cm of the grating surface.

20. a) Describe the process of Polarization by reflection.

                (OR)

   b) We wish to use a plate of glass with refractive index n = 1.50, in air as apolarizer. Find the polarizing angle and the angle of refraction.

21. a) Write a note on total internal reflection.

                (OR)

   b) Green liht of wavelength $5100A^{o}$ from a narrow slik is incident on a double slit. If the overall separation of 10 fringes on a screen $200cm$ away is $2cm$. Find the slit separation.

22. a) Derive the formula for the minima in the single slit diffraction.

(OR)

b) How many orders will be visible if the wavelength of the incident

radiation is $5000A^o$ and the number of lines on the grating is 2620 in

one inch.

SECTION – D

Answer any THREE Questions :   **(3 × 10 = 30)**

23. Describe the theory of double slit interference.

24. Explain the production of X-rays and the use of X-ray diffraction in

sodium chloride structure analysis.

25. Give an brief account of polarizing sheets.

26. Explain the working principle of Michelson's interferometer. Also how to

measure the changes in the length by means of interferene fringes.

27. Explain the theory of double slit interference and diffraction combined.

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B.Sc. Physics Degree (Semester) Examinations, April 2020

Part – III : Core Subject : Fourth Semester : Paper – I

ANALOG ELECTRONICS

Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 $\times$ 1 = 10)**

1. An ideal crystal diode is one which behaves as a perfect _____ when forward biased

   a) conductor   b) insulator   c) resistance material d) semiconductor

2. A Zener diode is _____ device.

   a) a non-linear   b) a linear   c) an amplifying   d) a rectifying

3. The element that has the biggest size in a transistor is _____

   a) collector   b) base   c)emitter   d) collector base junction

4. The value of β for a transistor is generally _____

   a) 1   b) less than 1   c) Between 20 and 500   d) above 500

5. The operating point _____ on the a.c. load line.

   a) also lies   b) does not lies

   c) may or may not lie   d) data insufficient.

6. 1 *db* corresponds to _____ change in power level

   a) 50%   b) 35%   c) 26%   d) 22%

7. A Wein's bridge oscillator uses _____ feedback

   a) only positive   b) only negative

   c) either positive or negative   d) neither positive nor negative

8. Quarts crystal is most commonly used in crystal oscillators because

   _____

a) it has superior electrical properties   b) it is easily   available

c) it is quite inexpensive   d) it is high strength

9. In an AM Wave, useful power is carried by _____

a) carrier   b) side band

c) carrier and side band   d) lower band

10. Manmade noises are _____ variations.

a) amplitude   b) frequency   c) phase   d) both frequency and phase

SECTION – B

Answer any FIVE Questions :   **(5 × 2 = 10)**

11. What is the efficiency of half wave rectifier?

12. What is a filter circuit?

13. Draw the symbols for pnp and npn BJT.

14. What do you mean by faithful amplification?

15. Draw the schematic symbol of two types of JFEET.

16. What is the main difference between JFET and Bipolar Transistor?

17. Write any two advantages of JFET.

SECTION – C

Answer ALL Questions :   **(5 × 5 = 25)**

18. a) Explain, with a circuit diagram, the operation of a Zenor diode voltage

regulator.

(OR)

b) An a.c. voltage of peak value $20V$ is connected in series with a silicon

diode and load resistance of 500Ω. If the forward resistance of diode is

10Ω. Find   i) peak current through diode   ii) peak output voltage.

19. a) Describe an experiment to draw the output characteristics of JFET.

(OR)

b) The applied input a.c. power to a half-wave rectifier is 100 watts.

The d.c. output power obtained is 40 watts.

i) What is the rectification efficiency?

ii) What happens to remaining 60 watts?

20. a) Describe the working of half wave rectifier.

(OR)

b) Explain the working of capacitor filter.

21. a) Briefly explain about power rating of transister.

(OR)

b) A JFET has the following parameters: $I_{DSS} = 32mA$; $V_{GS(off)} = -8V$;

$V_{GS} = -4.5V$. Find the value of drain current?

22. a) Discuss about the parameters of JFET.

(OR)

b) A JFET has a drain current of $5mA$. If $I_{DSS} = 10mA$ and $V_{GS_{(off)}} = -6V$;

Find the value of   i) V_{GS} and   ii) V_p

SECTION – D

Answer any THREE Questions :   **(3 × 10 = 30)**

23. Explain the working of bridge Rectifier.

24. Explain what is "load line" and "operating point" of transistor amplifier.

25. With a neat Circuit Diagram, explain the working of RC-Coupled

transistor amplifier.

26. Draw the circuit diagram and explain   i) Choke input filter

ii) Capacitor input filter

27. Discuss about transistor load line analysis.

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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – III : Core Subject : Fourth Semester : Paper – II
NUMERICAL METHODS
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. Newton's method uses

   a) Euler's algorithm   b) Taylor expansion

   c) Interpolation formula   d) Lagrange algorithm

2. Bisection method is also known as _____.

   a) Regular false method   b) Bolzano method

   c) Method of false position   d) Method of tangents

3. Gauss Jordan method is _____ method.

   a) direct   b) indirect   c) interactive   d) iterative

4. The goal of forward elimination steps in Naive Gauss elimination

   method is to reduce the coefficient matrix to a (an) _____ matrix.

   a) diagonal   b) identity

   c) lower triangular   d) upper triangular

5. _____ is the process of finding the most appropriate

   estimate for missing data.

   a) finite difference   b) iteration

   c) interpolation   d) root finding

6. Newton's forward interpolation formula is not applicable to

   extrapolate near the _____ value of the table.

   a) beginning   b) ending   c) central   d) one third

7. The error is Trapezoidal rule is of order _____ .

    a) h b) h^2 c) h^3 d) h^4

8. In Simpson's $(1/3)^{rd}$ Rule the number of intervals _____ .

    a) odd   b) even   c) multiple of 3   d) multiple of 6

9. A differential equation is considered to be ordinary if it has

    a) one dependent variable

    b) more than one dependent variable

    c) one independent variable

    d) more than one independent variable

10. Given : $3\dfrac{dy}{dx}+5y^5=\sin x,\ y(0.3)=5.$ and using a step size of h=0.3,

    the value of using Euler's method y(0.9) is most nearly

    a) -36.318 b) -35.318   c) -658.91   d) -669.05

SECTION – B

Answer any FIVE Questions :   (5 × 2 = 10)

11. What is the disadvantage of Bisection method?

12. Write down the iterative formula of Newton-Raphson method.

13. Distinguish between Gauss Elimination and Gauss- Jordan method.

14. What do you mean by simultaneous linear algebraic equations?

15. Give the main features of Gregory – Newton's forward interpolation formula.

16. Why do we prefer polynomial interpolation?

17. Give an example of transcendental equation.

SECTION – C

Answer ALL Questions :   (5 × 5 = 25)

18. a) Find the positive root of $x-\cos x=0$ by bisection method.

         (OR)

    b) Find the positive root of $f(x)=2x^3-3x-6=0$ by Newton –

       Raphson method correct to five decimal places.

19. a) Solve the system of equations by Gauss – Elimination method:

$$x+2y+z=3$$
$$2x+3y+3z=10$$
$$3x-y+2z=13$$

         (OR)

    b) Solve by Gauss – Elimination method:

$$2x+3y-z=5$$
$$4x+4y-3z=3$$
$$2x-3y+2z=2$$

20. a) Find a Polynomial of degree two which takes the values.

x	0	1	2	3	4	5	6	7
y	1	2	4	7	11	16	22	29

         (OR)

    b) Apply Gauss's formula to find $f(x)\,at\,x=3.5$ from the table below:

x	2	3	4	5
f(x)	2.626	3.454	4.784	6.986

21. a) Solve the equation $x^3+x^2-1=0$ for the positive root by iteration method.

         (OR)

b) Solve the system of equation by Gauss-seidel Method

$$x + y + 54z = 110$$

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

22. a) From the following table of half-yearly premium for policies
maturing at different ages, estimate the premium for policies
maturing at age 46 and 63.

Age x :	45	50	55	60	65
Premium y :	114.84	96.16	83.32	74.48	68.48

[OR]

b) Find a positive root of $xe^x = 2$ by the method of False position.

SECTION – D

Answer any THREE Questions :   **(3 × 10 = 30)**

23. Find positive root of $x^3 = 2x + 5$ by False position method.

24. Solve the system by Gauss – Seidel method

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

$$6x + 3y + 12z = 35$$

25. Derive Gregory - Newton forward interpolation formula .

26. Find the value of y at $x = 21$ and $x = 28$ from the following data.

x :	20	23	26	29
y :	0.3420	0.3907	0.4384	0.4848

27. Find the positive root of y at $x = 21$ and $x = 28$ correct to four
decimal places by bisection method.

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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – III : Core Subject : Sixth Semester : Paper – I

NUCLEAR PHYSICS
Under CBCS – Credit 4

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 $\times$ 1 = 10)**

1. The binding energy per nucleon is plotted as a function of

   a) atomic number   b) temperature   c) mass number   d) neutron number

2. The Betatron is a device to accelerate

   a) protons   b) electrons   c) neutrons   d) mesons

3. The circular path traversed by the beta particles of velocity v is governed

   by the relation

   a) Br (e/m)   b) Br^2 (e/m)   c) Br (m/e)   d) Br (e^2/m)

4. The S.I. unit of activity is named after

   a) Curie   b) Bohr   c) Henri Becquerel d) Rutherford

5. For an exoergic reaction

   a) Q > 0   b) Q < 0   c) Q = 0   d) Kinetic energy =0

6. Fast neutrons are neutrons with energies range between 0.5 to

   a) 10 MeV   b) 5 MeV   c) 50 MeV   d) 1 MeV

7. Fusion reactions are called _____

   a) compound reactions   b) thermoduric

   c) thermo uric   d) thermonuclear

8. In which of the following reactor is fission caused by slow or thermal neutrons?

   a) thermal reactor b) burner reactor   c) fast reactor   d) breeder reactor

9. What type of elementary particles are electrons?

   a) Quarks   b) Photons   c) Leptons   d) Gluons

10. Formula for the hyper charge is

    a) $Y = S + B$ b) $Y = S-B$ c) $Y = S + I$ d) $Y = S - I$

SECTION – B

Answer any FIVE Questions : $(5 \times 2 = 10)$

11. Write a few properties of nucleus.

12. Define Binding Energyof a nucleus.

13. State Geiger – Nuttal Law.

14. Illustrate one application of radio isotope briefly.

15. Distinguish between Nuclear fission and Nuclear fusion.

16. List the kinds of fundamental interactions between elementary particles.

17. State Hubbles Law.

SECTION – C

Answer ALL Questions : $(5 \times 5 = 25)$

18. a) Explain the Meson Theory of Nuclear forces.

                    (OR)

   b) An ionization chamber is connected to an electrometer of capacitance 0.5pF and voltage sensitivity of 4 divisions per volt. A beam of alpha particles causes a deflection of 0.8 divisions. Calculate the number of ion pairs required and the energy of the alpha particles. Given that 1 ion pair requires energy of 35eV and e = 1.6×10^{-19}C.

19. a) Write Soddy Fajan's Displacement law, deduce the law of radioactive disintegration and hence derive half life period.

                    (OR)

   b) The half –value period of radium is 1590 years. In how many years will one gram of pure element:

   a) lose one centigram, and   b) be reduced to one centigram.

20. a) Explain the Rutherfords experiment on Artificial transmutation.

                    (OR)

   b) The Q value of the $Na^{23}(n,\alpha) F^{20}$ reaction is – 5.4 MeV. Determine the threshold energy of the neutons for this reaction. (Given : mass of the incident particle is 1.008665u and mass of the target Nucleus is 22.9898 u).

21. a) Explain the working of Pressurized Water Reactor.

                    (OR)

   b) A reactor is developing energy at the rate of 32×10^6watts.   How many atoms of U -235 undergo fission per second ? Assume that on the average, an energy of 200MeV is released per fission.

22. a) Write a short note on Quark Model.

                    (OR)

   b) Using the Law of conservation of lepton numbers. Find which of the following reactions is possible.

        a) $p + \overline{\gamma}_e \rightarrow n + \mu^+$ b) $p + \overline{\gamma}_e \rightarrow n + e^+$

SECTION – D

Answer any THREE Questions :   **(3 × 10 = 30)**

23. Explain the liquid drop model of nuclear structure.

24. Compare the properties of alpha, beta and gamma rays.

25. Compose basic properties, classification, neutron sources and neutron

     detection of neutrons.

26. Describe the construction and working principle of Nuclear reactor.

27. Classify the elementary particles of a Nucleus.

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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – III : Elective Subject : Sixth Semester : Paper – I
MODERN PHYSICS
Under CBCS – Credit 5

Time: **3** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. If a particle is acted upon by a conservative force, its total _____ is conserved.

   a) force   b) energy   c) momentum   d) torque

2. The Lagrangian for a linear harmonic oscillator is

   a) $m\ddot{x} + kx = 0$ b) $m\ddot{x} = 0$ c) $k\ddot{x} = 0$ d) $k\dot{x} = 0$

3. In Hamiltonian's canonical equations of motion, the position coordinate q_j is defined as $\dot{q}_j =$

   a) $\partial H/\partial q_j$ b) $\partial H/\partial t$ c) $\partial H/\partial p_j$ d) $\partial L/\partial t$

4. For a compound pendulum, the potential energy V = _____

   a) $mgl\cos\Theta$ b) $-mgl\cos\Theta$ c) mgl d) $mgl\sin\Theta$

5. Compton wavelength of the scattering particle is defined as $\lambda_c =$ _____

   a) h/mc b) hmc c) mc/h d) m/ch

6. The particle's momentum, in terms of wave number p = _____

   a) $kh/2\pi$ b) $2\pi hk$ c) $2\pi/kh$ d) $kh\pi/2$

7. Total energy of a particle in terms of frequency E = _____

   a) $h\nu$ b) h/ν c) ν/h d) $2\pi h\nu$

8. Potential energy curve of a harmonic oscillator is a _____

    a) straight line   b) parabola   c) hyperbola   d) ellipse

9. In the equation $E = mc^2$, what does 'c' stand for?

    a) Conductance   b) charge   c) speed   d) velocity

10. An object moving with the speed of light, the mass of an object is

    a) zero   b) infinity   c) finite   d) not measurable

SECTION – B

Answer any FIVE Questions :   **(5 × 2 = 10)**

11. What are constraints of motion? Give an example.

12. State D'Alembert's principle.

13. Define phase space.

14. Elucidate the significance of conservation lanes.

15. What is Quantum Mechanics?

16. Write a note on the ether hypothesis.

17. Define inertial and non-inertial frames.

SECTION – C

Answer ALL Questions :   **(5 × 5 = 25)**

18. a) What do you understand as a system of particles? State and prove the conservation of angular momentum for a system of particles.

(OR)

b) Deduce the Lagrangian equation of motion for a simple pendulum.

19. a) Define Hamiltonian and derive the Hamiltonian equations of motion.

[OR]

b) Obtain the Hamiltonian equations of motion for a linear harmonic oscillator.

20. a) Deduce Newton's second law of motion from Hamilton's Principle.

[OR]

b) Obtain Hamilton's equations of motion for a compound pendulum.

21. a) Derive the Schrodinger's time dependent equation.

[OR]

b) Explain the operators for momentum and energy.

22. a) Explain the special theory of relativity.

[OR]

b) Derive an expression for Galilean transfermation equations.

SECTION – D

Answer any THREE Questions :   **(3 × 10 = 30)**

23. State Hamilton's variational principle and deduce Lagrange's equation of motion.

24. Apply the variational principle to derive Hamilton's canonical equations.

25. Deduce Hamilton's Principle from D'Alembert's Principle.

26. Discuss briefly about the wave function and wave equation.

27. With suitable diagram, describe the Michelson-Morley experiment. Also explain the outcomes of this experiment.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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[Affiliated to Madurai Kamaraj University]

B.A. & B.Sc. Degree (Semester) Examinations, April 2020
Part – IV : Non Major Elective Subject : Second Semester : Paper – I

ELECTRICAL HOME APPLIANCES
Under CBCS – Credit 2

Time: **2** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. The relation for Ohm's law is

   a) V = IR   b) I = V/R   c) R = V/I   d) all the above

2. The flow of electrons are_____.

   a) current   b) frequency   c) voltage   d) amplitude

3. The frequency of alternating current supply is

   a) 0 Hz   b) 40 Hz   c)   50 Hz   d) 70 Hz

4. Which working principle behind the transformer?

   a) snell's law   b) Joule heating effect

   c) electromagnetic induction   d) Ohm's law

5. The life hours of florescent tube are

   a) 100 hours   b) 1000 hours   c) 5000 hours   d) 10000 hours

6. The term CFL stands for

   a) Compact Fluorescent Lamp   b) Compact Fluid Lamp

   c) Common Fluorescent Lamp   d) Compact Fluorescent Light

7. Which electrical appliance that converts electrical energy in to heat energy?

   a) Washing machine   b) Radio

   c) Television   d) Electric heater

8. The boiling point of water is

   a) 36.9°C   b) 100.0 °C   c) 60.0 °C   d) 56.9°F

9. The material nichrome is the composition of

   a) nickel + copper   b) silver + chromium

   c) nickel + chromium   d) aluminium + nickel

10. Which of the following motors is used in ceiling fan?

   a) universal motor   b) synchronous motor

   c) series motor   d) induction motor

SECTION – B

Answer any FIVE Questions :   **(5 × 2 = 10)**

11. Define the term neutral.

12. What is DC supply?

13. Give any two advantages of the transformer.

14. What is meant by choke?

15. Define electric lamps.

16. Write any two points about LED?

17. What is Current?

SECTION – C

Answer ALL Questions :   **(3 × 9 = 27)**

18. a) What is AC supply? Explain single phase and two phase power supply.

                  (OR)

   b) Distinguish between alternating current and direct current.

19. a) Give a brief account of choke coil.

                  (OR)

   b) Explain about three phase supply.

20. a) Explain the concept of electric heaters and its uses.

                  (OR)

   b) Write a brief note on table and ceiling fans

SECTION – D

Answer any TWO Questions :   **(2 × 14 = 28)**

21. What is a transformer? Briefly describe its construction and its uses with a suitable diagram.

22. Briefly explain about the construction and working principle of an incandescent lamp.

23. With suitable examples, discuss about the seven-segment display.

24. Describe the working principle of an electric iron box with a neat diagram.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – IV : Skill Based Subject : Fourth Semester : Paper – I

ASTROPHYSICS
Under CBCS – Credit 2

Time: **2** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. The spiral galaxies according to their size of the nuclei are classified into three groups

   a) b,c,d   b) a,d,c   c) a,b,d   d) a,b,c

2. Most of our galaxy is about _____ billion times that of the sun.

   a) 200   b) 150   c) 250   d) 100

3. Central part o f the sun is called as

   a) corona   b) core

   c) photosphere   d) stratosphere

4. A white dwarf is _____ star.

   a) new born   b) living   c)dead   d) none

5. When the moon's shadow crosses the earth's surface, the eclipse occurred is

   a) Solar eclipse   b) lunar eclipse   c) blue moon   d) full moon

6. The ability of a telescope to separate the angular distances between neighbouring stars is called _____.

   a) dispersive power   b) resolving power

   c) dispersion   d) resolution

7. Which of the following wavelength regions cannot be studied with telescopes on ground?

   a) radio waves   b) X-rays   c) ultraviolet   d) infrared rays

8. Most familiar and characteristic features on the moon are its

   a) mountains   b) maria   c) craters   d) volcanoes

9. A Star emits its maximum energy at _____wavelength

   a) short   b)medium   c) long   d) ratio

10. The dark region of the sunspot is

    a) chromospheres   b) photosphere

    c) umbra   d) corona

SECTION – B

Answer any FIVE Questions :   **(5 × 2 = 10)**

11. What is an optical telescope?

12. What are the elements in the telescope?

13. What is a star model?

14. What are irregular galaxies?

15. Define protostar.

16. What is the sunspot?

17. Where O and B stars born?

SECTION – C

Answer ALL Questions :   **(3 × 9 = 27)**

18. a) Explain solar and lunar eclipses with neat diagram.

   (OR)

   b) Derive an expression for luminosity of a star.

19. a) Discuss in detail about the interior of the sun.

   (OR)

   b) Explain radio telescope in detail.

20. a) Explain structure of Milky way galaxy with suitable diagram

   (OR)

   b) Differences between the refracting and reflecting telescope.

SECTION – D

Answer any TWO Questions :   **(2 × 14 = 28)**

21. Mention the classification of galaxies and explain its structure and differential galactic rotation with relevant diagram.

22. Explain refracting and reflecting telescope in detail.

23. Explain about the sunspet in detail.

24. Give a brief account on solar atmospheres and it slayers.

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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – IV : Skill Based Subject : Sixth Semester : Paper – I

NANOTECHNOLOGY
Under CBCS – Credit 2

Time: **2** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. The structured size of nanomaterial is about

   a) 1 to 100 cm   b) 1 to 100nm   c) 1 to 100μm   d) 1 to100 mm

2. Bragg's law is 2d sinθ = _____.

   a) nω   b) nΩ   c) nψ   d) nλ

3. The energy separation between valence band and conduction band is called

   a) E_m b) E_f c) E_g d) E_h

4. A crystal structure is a periodic arrangement of _____ in a crystal.

   a) molecules   b) atoms   c) ions   d) none of these

5. The thermal conductivity of nanomaterial is _____ times greater than a metal.

   a) 2   b) 3   c) 5   d) 10

6. Sol-gel is _____ approach.

   a) Bottom-up   b) Top-Down

   c) sputtering   d) chemical vapour deposition

7. Atomic force microscopy (AFM) is also known as

   a) Scanning probe microscopy (SPM)

   b) Scanning Electron microscope (SEM)

   b) Electron microscope

   d) none of the above

8. Which of the following characterisation shows the elemental composition of nanomaterials?

   a) XRD   b) EDAX   c) UV   d) FTIR

9. Which of the following component used in the AFM?

   a) Cantilever   b) Electrode   c) diode   d) knife

10. An important consequence of using the UV-Visible spectroscopy is that

   _____ of nanomaterial can be determined.

   a) Emission wavelength   b) excitation wavelength

   c) Band gap   d) bonding structure

SECTION – B

Answer any FIVE Questions :   **(5 × 2 = 10)**

11. What is nanotechnology?

12. Write down about the physical & chemical properties of nanomaterials.

13. What is band gap?

14. List out the various types of crystal structures.

15. Mention some characterization techniques to analyse nonmaterial.

16. Define nanocomposite.

17. Mention the types of nanomaterials.

SECTION – C

Answer ALL Questions :   **(3 × 9 = 27)**

18. a) Explain about the role of bottom-up and top-down approaches in nanotechnology.

(OR)

   b) Explain about nanocomposite and its types.

19. a) Describe about surface morphological studies of nanoparticles.

(OR)

   b) Explain about the electro deposition method.

20. a) Give a detail account on Atomic Force Microscope (AFM).

(OR)

   b) Illustrate the structural properties using X-Ray diffraction.

SECTION – D

Answer any TWO Questions :   **(2 × 14 = 28)**

21. Discuss briefly about the Sol-gel process.

22. Explain about the various properties of nanomaterials.

23. Give a brief account on application of nano materials.

24. Discuss in detail about the SEM technique used for nanomaterials.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – IV : Skill Based Subject : Sixth Semester : Paper – II
PHYSICS FOR COMPETITIVE EXAMINATIONS
Under CBCS – Credit 2

Time: **2** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. The dimensions of a couple is

   a. ML^2T^{-2} b. MLT^{-2} c. $ML^{-1}T^{-3}$ d. $ML^{-2}T^{-2}$

2. The unit of G in SI system is

   a. $Nm^{-2}kg^{-2}$ b. $Nm^{-2}s^{-2}$ c. Nms^{-2} d. Nm^2kg^{-2}

3. The SI unit of universal gas constant (R) is

   a. $JK^{-1}mol^{-1}$ b. $NK^{-1}mol^{-1}$ c. $WattK^{-1}mol^{-1}$ d. $ergK^{-1}mol^{-1}$

4. The dimensional formula for Planck's constant (h) is

   a. $[ML^2T^{-3}]$ b. $[ML^2T^{-2}]$ c. $[ML^2T^{-1}]$ d. $[ML^{-2}T^{-2}]$

5. Newton's first law of motion gives the concept of

   a. energy   b. work   c. inertia   d. momentum

6. A canon after firing recoils due to

   a. conservation of energy   b. backward thrust of gases produced

   c. Newton's third law of motion   d. Newton's first law of motion

7. A rocket or jet engine works on the principle of

   a. conservation of linear momentum

   b. conservation of angular momentum

   c. conservation of energy

   d. conservation of mass

8. Two bodies of mass 1 kg and 4 kg are moving with equal kinetic energies. The ratio of their linear momentum is

   a. 1:2   b. 2:1   c. 4:1   d. 1:4

9. The period of the pendulum is doubled when

   a. its length is doubled   b. the mass of the bob is doubled

   c. its length is made 4 times

   d. the mass of bob and the length of the pendulum are doubled

10. A loaded spring vibrates with a period T. The spring is now divided into nine equal parts and the same load is suspended from one of these parts. The new period is

   a. T/3   b. T/9   c. 3T   d. T

11. The equivalence of two systems in thermal equilibrium is represented by the property

   a. temperature   b. heat   c. specific heat   d. energy

12. An ideal gas heat engine operates in a Carnot cycle between 227 ° C and 127 ° C. It absorbs 6×10^4 cals at the higher temperature. The amount of heat converted into work is equal to

   a. 4.8×10^4 cals b. 3.5×10^4 cals c. 1.6×10^4 cals d. 1.2×10^4 cals

13. The area under the curve on P-V diagram represents

   a. work done on or by the system   b. work done in a cyclic process

   c. the thermodynamic process   d. the condition of the system

14. A perfect gas is compressed to ¼ th of its original volume. The initial pressure of the gas is 1 atm. If the compression is isothermal, the final pressure will be

   a. 4 atm   b. ¼ atm   c. 16 atm   d. 1/16 atm

15. The freezer in a refrigerator is located in the top section so that

   a. the entire chamber of the refrigerator is cooled quickly

   b. motor is not heated

   c. heat gained from environment is less

   d. heat gained from environment is more

16. The radiation emitted by a perfectly black body is proportional to

   a. temperature on the ideal gas scale

   b. fourth root of temperature on ideal gas scale

   c. fourth power of temperature on ideal gas scale

   d. source of temperature on ideal gas scale

17. In the propagation of electromagnetic waves the angle between the direction of propagation and plane of polarization is

   a. 0°   b. 45°   c. 90°   d. 180°

18. Quantum nature of light is not supported by the phenomenon of

   a. Compton effect   b. photoelectric effect

   c. emission or absorption spectrum   d. interference of light waves

19. The energy and momentum of a photon are given by $E=h\nu$ and $P=h/\lambda$ respectively. Velocity of the photon will be

   a. EP   b. E/P   c. P/E   d. E/P^2

20. The frequency of a light wave is 6.4×10^{14} Hz. Its energy in eV will be ($h=6.6 \times 10^{-34}$ J-sec)

   a. 5.28 eV   b. 3.96 eV   c. 2.64 eV   d. 1.32 eV

21. When a soap film (or oil film) on water is observed in daylight, it exhibits beautiful colours due to

   a. interference   b. dispersion   c. reflection   d. refraction

22. In Young's two slits interference experiment if the distance between the silts is made 3 fold, the fringe width becomes

    a. 1/3 fold   b. 2 fold   c. 1/9 fold   d. 9 fold

23. Hardness of magnetic material is measured by the value of

    a. magnetic induction

    b. intensity of magnetisation

    c. density of magnetic material

    d. coercive force

24. Curie temperature is that temperature at which the ferromagnetic material

    a. has maximum susceptibility   b. has zero susceptibility

    c. loses its ferromagnetism   d. develops reverse polarity

25. A circular coil of radius 4 cm having 50 turns carries a current of 2A. It is placed in uniform magnetic field of 0.1 wb/m^2. The work done to rotate the coil from equilibrium position by 180° is

    a. 0.1 J   b. 0.2 J   c. 0.4 J   d. 0.8 J

26. F_g and F_e represent the gravitational and electrostatic forces respectively between electrons situated at some distance. The ratio of F_g/F_e is of the order of

    a. 1   b. 10   c. 10^{-43} d. 10^{-37}

27. When the distance between two charged particles is halved, the force between them becomes

    a. one-fourth   b. one-half   c. double   d. four times

28. A diople of electric dipole moment P is placed in a uniform electric field of strength E. If θ is the angle between positive directions of P and E, then the potential energy of the electric dipole is largest when θ is

    a. zero   b. $\pi/2$ c. π d. $\pi/4$

29. Electric potential due to a point charge and a dipole respectively are directly proportional to

a. r^{-1}, r^{-2} b. r^1, r^{-1} c. r^{-2}, r^{-3} d. r^{-2}, r^{-2}

30. The velocity of an electron which passes through a potential difference of 1000 volts is

a. 1.87×10^7 m/s   b. 18.7×10^7 m/s

c. 0.187×10^7 m/s   d. 187×10^7 m/s

31. A condenser is charged through a potential difference of 200 volts and possesses a charge of 0.1 Coulomb. When discharged it would release an energy of

a. 1 J   b. 2 J   c. 10 J   d. 20 J

32. Three condensers of capacitances 10, 20 and 30 μF are first connected in series and then connected in parallel. The ratio of the resultant capacitances in the two cases is

a. 1:11   b. 11:1   c. 1:6   d. 6:1

33. The capacity of a parallel plate capacitor is 4 μF. The distance between the plates is doubled. The new capacity is

a. 8 μF   b. 4 μF   c. 2 μF   d. 1 μF

34. The effective resistance of three resistances 2 Ω , 4 Ω and 6 Ω connected in parallel is

a. 12/11 Ω   b. 11/12 Ω   c. 12 Ω   d. 0 Ω

35. n similar resistors each of resistance r when connected in parallel has the total resistance R. When these resistances are connected in series, the total resistance will be

a. n^2R b. nR   c. R/n   d. R/n^2

36. Two free parallel wires carrying currents in the opposite direction
    a. attract each other
    b. repel each other
    c. do not affect each other
    d. get rotated to be perpendicular to each other

37. The current in an inductor is reduced to half. The energy stored in it
    a. is doubled
    b. reduces to one-fourth of its initial value
    c. remains unchanged
    d. reduces to half of its initial value

38. The velocity of certain ions that pass undeflected through crossed E and B fields for which E = 7.7 kV/m and B = 0.14 T
    a. 22 km/s   b. 33 km/s   c. 44 km/s   d. 55 km/s

39. A coil of 20 turns has an area of 800 mm^2 and bears a current of 0.5 A. It is placed with its plane parallel to a magnetic field of intensity 0.3 T. The torque on the coil is
    a. 2.4 X 10^{-1} N-m   b. 2.4 X 10^{-2} N-m
    c. 2.4 X 10^{-3} N-m   d. 2.4 X 10^{-4} N-m

40. In a potentiometer, the length of its wire is doubled. The accuracy in determining the null point will
    a. decrease   b. increase
    c. remain unchanged   d. not be able to find

41. When different parts of a metal are kept at different temperatures and current is passed through it, the heat is either evolved or absorbed. The effect is called
    a. Peltier effect   b. Seebeck effect
    c. Thomson effect   d. Newton Cooling effect

42. A straight line conductor of length 0.4 m is moved with a speed of 7 m/s perpendicular to a magnetic field of intensity 0.9 wb/m^2. The induced e.m.f. across the conductor is
    a. 5.04 V   b. 1.26 V   c. 2.52 V   d. 25.2 V

43. Which of the following phenomena is utilised in the construction of the mouth-piece of a telephone?
    a. electromagnetic induction
    b. heating effect of electric current
    c. change of resistance with temperature
    d. electrical induction

44. To step up the voltage, the number of turns in the secondary should be
    a. less than the number of turns in the primary
    b. greater than the number of turns in the primary
    c. equal to the number of turns in the primary
    d. infinite

45. Core of a transformer is made of soft iron and laminated to
    a. reduce the heat loss
    b. reduce the eddy current loss
    c. reduce circuit permeability
    d. make assembly cheap and convenient

46. Reactance offered by a coil having no resistance in an a.c. circuit is equal to
    a. ωL   b. 1/ ωL   c. ω^2L^2 d. ωLR

47. An inductance of 0.4 Henry and a resistance of 100 Ω are connected in series with an A. C. supply of 220 volts, 50 c.p.s. Phase lag of current from e.m.f. applies is
    a. $\tan^{-1}(0.4\pi)$ b. $\tan^{-1}(\pi)$ c. $\tan^{-1}(4\pi)$ d. $\tan^{-1}(0.2\pi)$

48. A student has a coil of 3 mH and wishes to construct a circuit whose resonant frequency is 1000 kHz. The value of capacitor he must use is about (pico=10^{-12})

a. 8.5 pico farad   b. 0.8 pico farad   c. 85 pico farad d. 850 pico farad

49. In an LCR-series circuit R= $\sqrt{3}$ Ω, X_L = 10 Ω, X_C = 11 Ω, the applied voltage is 10 Volt (R.M.S). The impedance of the circuit is

a. 8 Ω b. 4 Ω c. 2 Ω d. 1 Ω

50. If E_{rms}, be the R.M.S value of e.m.f, then its peak-to-peak value is given by

a. $E_{rms}/\sqrt{2}$ b. $\sqrt{2}$ E_{rms} c. $2\sqrt{2}$ E_{rms} d. $E_{rms}/2$

51. The electron beam with velocities in the ratio 1:2 is subjected to identical magnetic fields at right angles to them. The ratio of the deflections produced will be

a. 1:2   b. 2:1   c. 1:4   d. 4:1

52. If elements with principal quantum number n > 4 were not allowed in nature, the number of possible elements would be

a. 60   b. 32   c. 4   d. 64

53. A proton, deuteron, and an α – particle are accelerated by the same potential difference. Their velocities will be in the ratio of

a. 1:1:1   b. $\sqrt{2}$:1:1   c. 1:1:$\sqrt{2}$ d. 1:$\sqrt{2}$:1

54. "There are discrete energy levels in atoms and molecules" was first demonstrated experimentally by
a. Frank Hertz experiment
b. Rutherford alpha scattering experiment
c. Davisson and Germer's experiment
d. G.P. Thomson's experiment

55. The intensity of X-rays depends upon
    a. kinetic energy of the electron striking the target
    b. number of electrons striking the target
    c. total momentum of the electron
    d. decelerating potential
56. The velocity of the photoelectrons depends upon
    a. frequency of the incident photon only
    b. intensity of the incident photon only
    c. intensity as well as frequency of the incident photon
    d. accelerating voltage applied
57. Light of two different frequencies, whose photons have energies 1 eV and 2.5 eV respectively, successively illuminate a metal whose work function is 0.5 eV. The ratio of the maximum speeds of the emitted electrons will be
    a. 1:5   b. 1:4   c. 1:2   d. 1:1
58. Wave nature of matter is not apparent to our daily observations because
    a. wavelength of the waves associated with the pretty heavy masses is very small
    b. wavelength of the waves associated with the pretty heavy masses is very large
    c. bodies travel with very large velocities
    d. bodies travel with very small velocities
59. The de Broglie wavelength (λ) of a particle of mass m and charge e, accelerated by a potential V is given by

    a. $\sqrt{2hmVe}$ b. $h\Big/\sqrt{2mVe}$ c. $h\sqrt{2mVe}$ d. $\dfrac{\sqrt{2mV}}{eh}$

60. If the de Broglie wavelengths of an alpha particle and neutron are the same, then the velocity of
    a. alpha particle is greater than that of neutron
    b. neutron is greater than that of alpha particle
    c. both neutron and alpha particle is same
    d. both particles can't be found from the given data

61. The uncertainty principle is applicable only when
    a. position is measured after the momentum
    b. momentum is measured after the position
    c. position and momentum are measured simultaneously
    d. position alone is measured

62. A spaceship 50 m long was to pass the earth travelling at 2.5×10^8 m/sec. Assuming a Lortenz-Fitzgerlad contraction, its apparent length will be
    a. 3 m   b. 30 m   c. 300 m   d. 0.3 m

63. Which of the following is not a mode of radioactive decay?
    a. positron emission   b. electron capture
    c. fusion   d. alpha decay

64. Nuclear force exist between
    a. proton-proton   b. neutron-neutron
    c. neutron-proton   d. all of the above

65. The phenomenon of nuclear fission to a certain extent can be easily explained by
    a. liquid drop model   b. shell model
    c. collective model   d. central force field model

66. Atomic power station at Tarapur has a generating capacity of 200 MW. The energy generated in a day by this station is
    a. 200 MW   b. 200 Joules
    c. 4800×10^6 Joules d. 1728×10^{10} Joules

67. With increase in temperature, the electrical conductivity of intrinsic semi-conductor
    a. increases   b. decreases
    c. first decreases and then increases   d. first increases and then decreases

68. Fermi energy is
    a. the minimum energy possessed by an electron at 0 K
    b. the maximum energy possessed by an electron at 273 K
    c. the maximum energy possessed by an electron at 0 K
    d. the minimum energy possessed by an electron at 273 K

69. One prefers to use a transistor as common emitter amplifier, because
    a. the current gain is very large and hence the power gain increases
    b. the current gain is small
    c. it is more safe to operate
    d. voltage gain is small

70. A bridge rectifier is preferred to an ordinary two-diode full wave rectifier because
    a. it has four diodes
    b. it has higher safety factor
    c. its transfer has no centre tap
    d. it needs much smaller transformer for the same output

71. The three axes of a crystal lattice are mutually perpendicular and two of the lattice parameters are equal. The crystal system is
    a. tetragonal   b. trigonal   c. rhombohedral   d. cubic

72. In a simple cubic lattice $d_{100} : d_{110} : d_{111}$ is
    a. $\sqrt{6} : \sqrt{3} : \sqrt{2}$ b. $6 : 3 : 2$ c. $6 : 3 : \sqrt{2}$ d. $\sqrt{6} : \sqrt{3} : \sqrt{4}$

73. Stars radiate light of their own because of
    a. fission reactions   b. chemical reactions
    c. mechanical contractions   d. fusion reactions

74. The binary code of $(21.25)_{10}$ is
    a. 10100.001   b. 10101.001   c. 10101.010   d. 10100.100

75. NAND and NOR gates are called universal gates primarily because they
    a. are widely used in IC packages
    b. are easier to manufacture
    c. can be combined to produce OR, AND and NOT gates
    d. are the only universally accepted gates

Y Y Y Y Y

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
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B.Sc. Physics Degree (Semester) Examinations, April 2020
Part – IV : Skill Based Subject : Sxith Semester : Paper – I

MEDICAL INSTRUMENTATION
Under CBCS – Credit 2

Time: **2** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. Any device converting one form of energy into another form is called

   a) amplifier   b) oscillator   c) rectifier   d) transducer

2. Bio-Medical instrument must have

   a) high precision   b) good calibration

   c) accurate output   d) all the above

3. Which one of the following is called "cardiac pacemaker"?

   a) Atrio-ventricular node   b) Sino Atrial node

   c) Purkinjie fibres   d) none of the above

4. The universally adopted ECG lead colour for Right leg is

   a) Brown   b) Green   c) Red   d) Yellow

5. Maximum amplitude of R wave is _____

   a) 0.25 mV   b) 1.60 mV   c) 0.5 mV   d) 0.1 mV

6. On the surface of the brain, the voltage is about

   a) 10 µV   b) 100 µV   c) 10 mV   d) 100 mV

7. _____ is a symptom for brain damage.

   a) Tumor   b) Brain death

   c) Epilepsy   d) none of the above

8. Advantage of Ventilator treatment are

   a) adequate ventilation   b) elimination of respiratory work

   c) increased intrathoracic pressure   d) all the above

9. Antiparticle of positron is

   a) Proton   b) Electron   c) Fermion   d) Boson

10. Radioisotope used in Gamma ray camera is

   a) O-15   b) N-13   c) Barium-131   d) C-11

SECTION – B

Answer any FIVE Questions :   **(5 × 2 = 10)**

11. Define linearity.

12. What do you mean by accuracy of a medical instrument?

13. What is called evoked potential?

14. What do you mean by REM sleep?

15. What is the frequency range of Alpha waves?

16. Write down the combination used in anesthetic Nitrous oxide.

17. What do you mean by Population inversion?

SECTION – C

Answer ALL Questions :   **(3 × 9 = 27)**

18. a) Draw the block diagram of Bio-Medical instrument system

                      [OR]

    b) Explain about Augmented unipolar Limb leads system used in ECG

19. a) Illustrate brain waves on the basis of frequency.

                      [OR]

    b) Explain various electro surgery techniques used in diathermy unit.

20. a) Describe the working of Gamma-ray camera

                      [OR]

    b) Discuss about Positron Emission Tomography

SECTION – D

Answer any TWO Questions :   **(2 × 14 = 28)**

21. Draw Einthoven triangle and explain Bipolar Limb leads.

22. Explain ECG recording setup with block diagram.

23. Describe the working of Ventilator Unit with its accessories.

24. Explain MRI system with block diagram.

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VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST
(Autonomous & Residential)
[Affiliated to Madurai Kamaraj University]

B.A. & B.Sc. Degree (Semester) Examinations, April 2020
Part – IV : Non Major Elective Subject : Second Semester : Paper – I

CIVIL DEFENCE AND ADVENTURE TRAINING
Under CBCS – Credit 2

Time: **2** Hours   Max. Marks: **75**

SECTION – A

Answer ALL Questions :   **(10 × 1 = 10)**

1. The strength of the Guard of Honour for President is

   a) 100   b) 150   c) 50   d) 125

2. The word of command Aram se meaning

   a) Stand easy   b) stand at ease   c) left turns   d) right turn

3. Sequence of firing is

   a) HAT   b) ATH   c) HTA   d) AHT

4. In MR, Green color represents

   a) Reserved forest   b) Cultivated area

   c) living area   d) dry river

5. Cadets stand one adjacent another is called

   a) file   b) Rank   c) blank file   d) None of these

6. The sequence of fire control order is

   a) GRIT   b) RGIT   c) TIGR   d) ITGR

7. In aadha dhaine mur the squad turns _____ degree right.

   a) 45°   b) 100°   c) 120°   d) 90°

8. For NCC training , the obstacle course consist of

    a) 10 obstacle   b) 12 obstacle   c) 15 obstacle   d) 5 obstacle

9. self- help measures adopted by civilian population are called

    a) self defence   b) civil defence

    c) Rescue service   d) salvage service

10. Two or more persons share some idea or information via some media is

    called

    a) communication   b) transmission

    c) receiver   d) Transreceiver

SECTION – B

Answer any FIVE Questions :   **(5 × 2 = 10)**

11. What is civil defence?

12. Write the parts of word of command.

13. What are the types of north?

14. What is communication?

15. Expand the term BHIM and NGO.

16. Write the uses of compass.

17. Define the term "Visharjan".

SECTION – C

Answer ALL Questions :   **(3 × 9 = 27)**

18. a) Write the five aims of Drill.

[OR]

    b) Explain the functions of Civil defence.

19. a) Explain the different types of ground.

[OR]

    b) Describe the methods of judging distance.

20. a) What are the types of adventure training?

[OR]

    b) Write the ten parts of the liquid prismatic compass.

SECTION – D

Answer any TWO Questions :   **(2 × 14 = 28)**

21. Explain the obstacle course for NCC cadets.

22. Write the properties of 7.62 mm SLR.

23. Explain the different methods of communication.

24. Write down the parts of 0.22'' rifle with neat diagram.

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