Mugberia Gangadhar Mahavidyalaya
Department of Physics
1^{st} Internal assessment, Semester II
Paper Name: Quantum Waves and Optics (C4)
Full Marks: 10; Time: 30 minutes

Answer any five of the following questions

1. Write the superposition principal of wave.
2. Write the Huygens Principle.
3. Write the difference between the Temporal and Spatial Coherence.
4. Drive the expression of Superposition of two collinear oscillations having equal frequencies.
5. Define the phase velocity and group velocity. Drive the relation between group velocity and phase velocity.
6. Show that the intensity for a plane progressive harmonic wave is the product of the r.m.s acoustic pressure and r.m.s particle velocity.
7. Prove that $\frac{\partial^2\Delta}{\partial t^2} = c^2\frac{\partial^2\Delta}{\partial x^2}$

Mugberia Gangadhar Mahavidyalaya

Department of Physics

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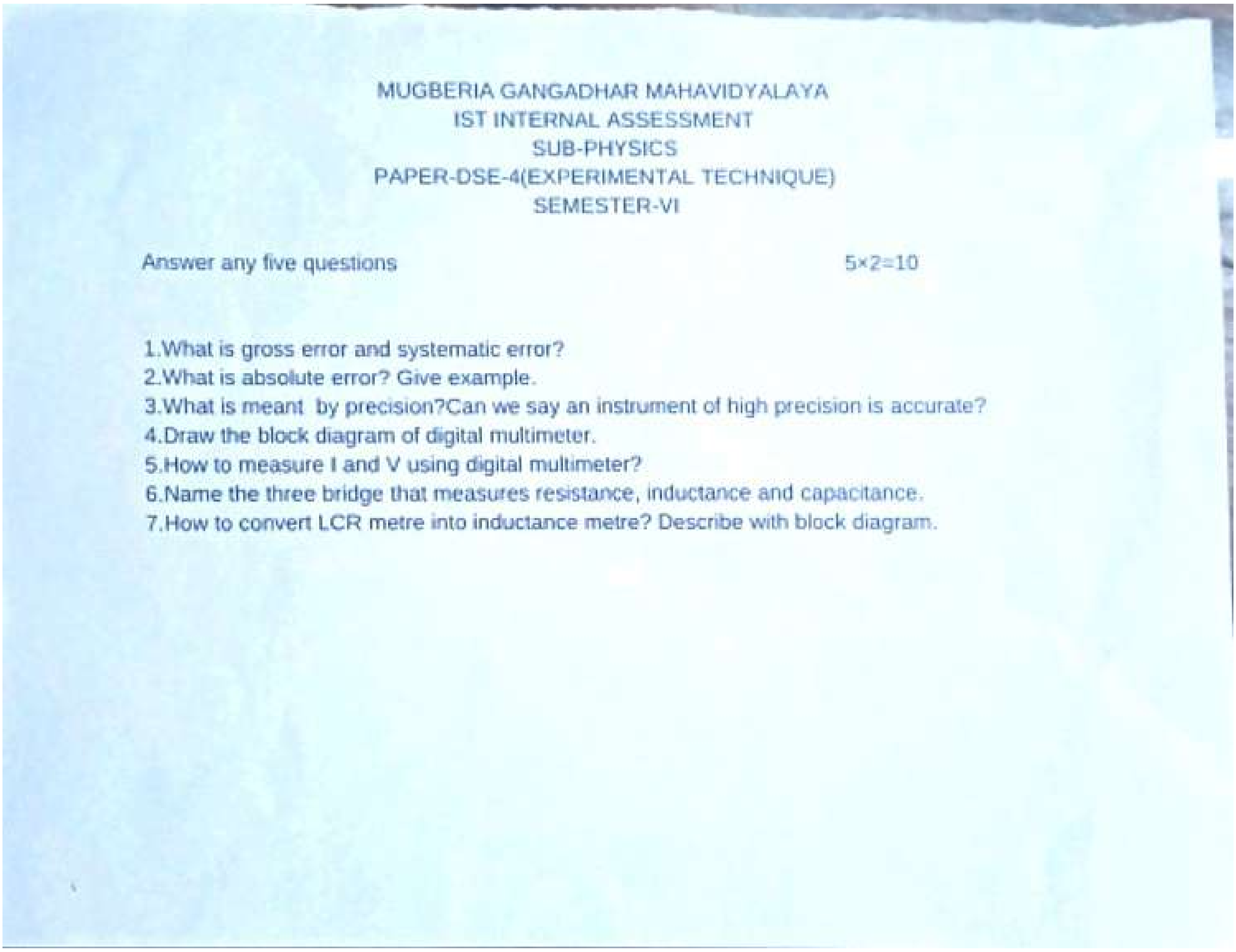


MUGBERIA GANGADHAR MAHAVIDYALAYA
IST INTERNAL ASSESSMENT
SUB-PHYSICS
PAPER-DSE-4(EXPERIMENTAL TECHNIQUE)
SEMESTER-VI

Answer any five questions 5×2=10

1.What is gross error and systematic error?
2.What is absolute error? Give example.
3.What is meant by precision?Can we say an instrument of high precision is accurate?
4.Draw the block diagram of digital multimeter.
5.How to measure I and V using digital multimeter?
6.Name the three bridge that measures resistance, inductance and capacitance.
7.How to convert LCR metre into inductance metre? Describe with block diagram.

Mugberia Gangadhar Mahavidyalaya
1st Internal Examination
Physics (Honours)
Paper - C-8T

Full Marks - 10 Time - 30 min

Answer any Five question. $2 \times 5 = 10$

1. Find the Fourier transform of the function

$$f(x) = \frac{1}{2\epsilon}, \quad |x| \le \epsilon$$
$$= 0, \quad |x| > \epsilon$$

2. If $F(s)$ is a complex Fourier transform of $f(x)$ then Prove that $F\{f(x)\cos ax\} = \frac{1}{2}\left[F(s+a) + F(s-a)\right]$

3. Discuss the Convolution theorem on Fourier transform.

4. Find the Fourier sine transform of e^{-x}

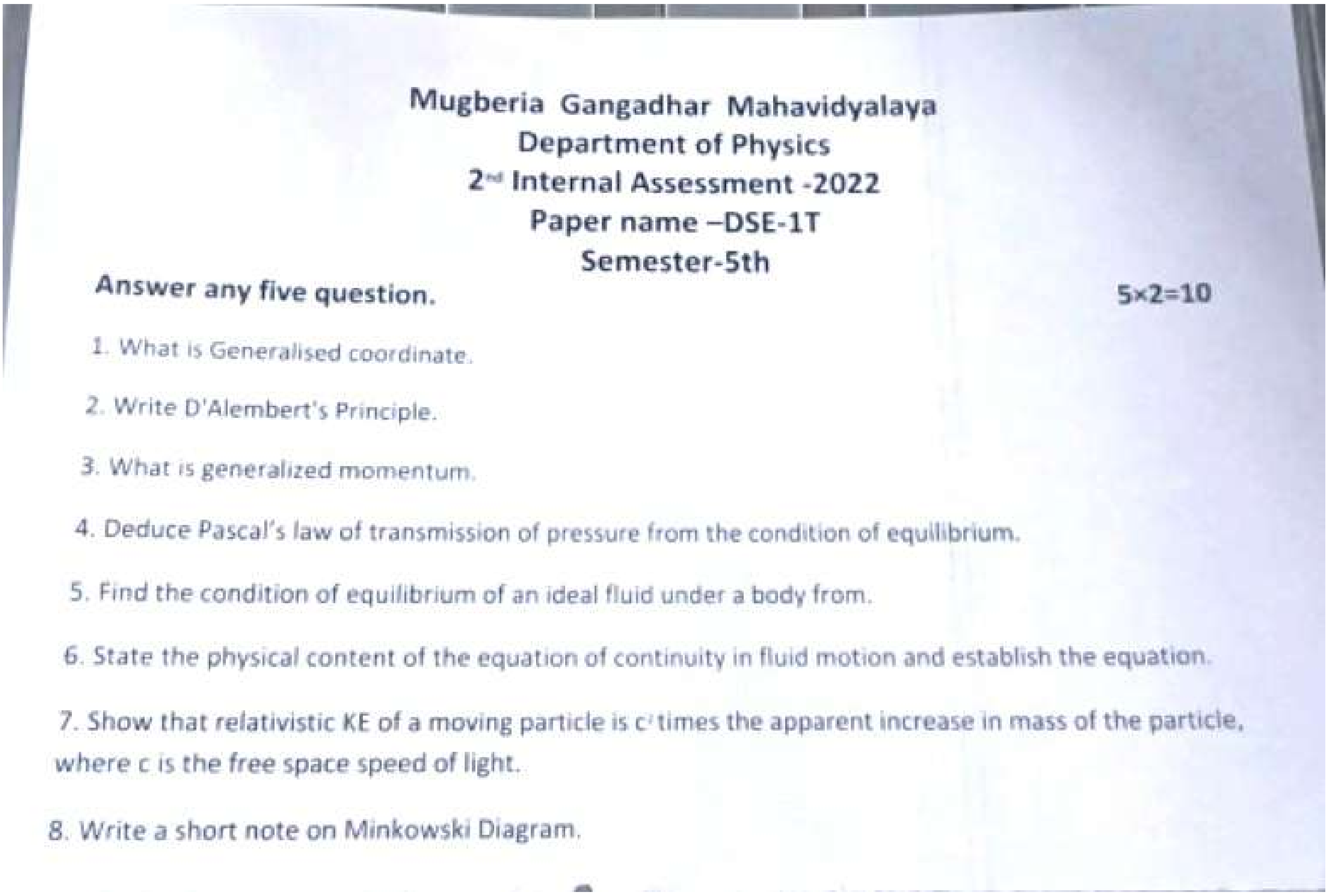
5. solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, $x>0$, $t>0$ subject to the conditions.

   i) $u=0$, when $x=0$, $t>0$, ii) $u = \begin{cases} 1, & 0 \le x \le 1 \\ 0 & x > 1 \end{cases}$ when $t=0$

   iii) $u(x,t)$ is bounded.

6. Prove that $F\{f^n(x)\} = (-is)^n F(s)$

7. Find the Fourier transform of e^{-ax^2}, where $a>0$



Mugberia Gangadhar Mahavidyalaya
Department of Physics
2nd Internal Assessment -2022
Paper name –DSE-1T
Semester-5th

Answer any five question. **5×2=10**

1. What is Generalised coordinate.

2. Write D'Alembert's Principle.

3. What is generalized momentum.

4. Deduce Pascal's law of transmission of pressure from the condition of equilibrium.

5. Find the condition of equilibrium of an ideal fluid under a body from.

6. State the physical content of the equation of continuity in fluid motion and establish the equation.

7. Show that relativistic KE of a moving particle is c^2 times the apparent increase in mass of the particle, where c is the free space speed of light.

8. Write a short note on Minkowski Diagram.

Mugberia Gangadhar Mahavidyalaya

2nd Internal Test,2022

Sem.-III (Physics)

Course- C-6T (Thermal Physics)

Full marks- 10 **Time -30min**

Candidates are required to give their answer in their own words as far as practicable.

Q. Answer any five questions.

1. Show that the equation PV^n=*Constant*, embraces all the processes –isobaric, isothermal, adiabatic and isochoric, depending on the value of n.

2. Show that the adiabatic reversible process is an isoentropic process?

3. If the equation of state for a gas with internal energy U is **PV=U/3**, what is the equation for the adiabatic process?

4. Why adiabatic curves are more steeper than isothermal curves?

5. What are the characteristics of a Carnot engine? Under what condition it will be 100% efficient?

6. **U=U(T,V)** is a state function , then show that **dQ= dU + PdV** is not an exact differential .

7. Define mean free path and Write down it's expression.

8. Describe the total degrees of freedom for monatomic and diatomic molecules

9. Estimate total number of air molecule in a room of capacity 25 m^3 at a temperature 27°C

MUGBERIA GANGADHAR MAHAVIDYALAYA

1st Internal Examination

CLASS-B.SC (General)

Semester-2

SUB-PHYSICS

T .M-10

ANSWER ANY FIVE...

1. Find out the angle between 2i+3j+k and i+j+k .

2. Write the physical interpretation of gradient of a scalar function.

3. Find the volume of parallelepiped if A=-3i+7j+5k, B=-3i+7j-3k and C=7i-5j-3k.

4.Φ=$3x^2$y-y3z2.find out the grad at point (1,-2,-2) $\phi = 3x^{\sim}y - y^{3}z^{\sim}$

5. What is axial vector..Give one example.

6. Find out the value of AXB.

IF A=2i+3j-k and B=3i-5j+k

Mugberia Gangadhar Mahavidyalaya
Department of Physics
1^{st} internal assessment
Semester: VI Paper: Statistical Mechanics (CC-14)

Answer all questions.

Full Marks 10 (5*2)

1. In how may way can five bosons be arranged in three quantum states?
2. Sketch the spectral distribution figure (u_λ vs λ) of blackbody radiation at two different temperature (T1>T2)
3. Drive Wien's Law and Rayleigh-Jean's Law from Planck's law.
4. Why micro canonical, canonical and grand canonical ensemble gives almost same results for a system of large number of particles?
5. How does Sackur Tetrode equation resolve the Gibb's Paradox ?

Mugberia Gangadhar Mahavidyalaya

Department of Physics

Semester-VI

1st Internal Assessment

Paper: CC-13T (Electromagnetic Theory)

Full Marks-10

A. Answer any five questions. ***2x5=10***

1. What is the physical significance of displacement current ?
2. In a medium of dielectric constant 5, the maximum displacement current is equal to the maximum conduction current at a frequency of 1 MHz .what is the conductivity of the medium?
3. State and write down the pointing theorem for an electromagnetic waves .
4. Show that electromagnetic wave is a transverse wave.
5. What is the wave Impedance? How can you relate the refractive index with dielectric constant?
6. Write down the Boundary condition for the magnetic intensity across the interface between two dielectric medium?
7. Show that an excess charge placed at any point in a medium of conductivity σ and permittivity ε decays exponentially with a time constant ε / σ.
8. State and explain Malus's low.
9. How can you distinguish between an elliptically polarized light and a mixture of plane polarized and un-polarized light?
10. Describe Shortly - a) Double Refraction
    b) Optics Axis

Mugberia Gangadhar Mahavidyalaya
Department of Physics
1^{st} internal assessment
Semester: VI Paper: Statistical Mechanics (CC-14)

Answer all questions.

Full Marks 10 (5*2)

1. In how may way can five bosons be arranged in three quantum states?
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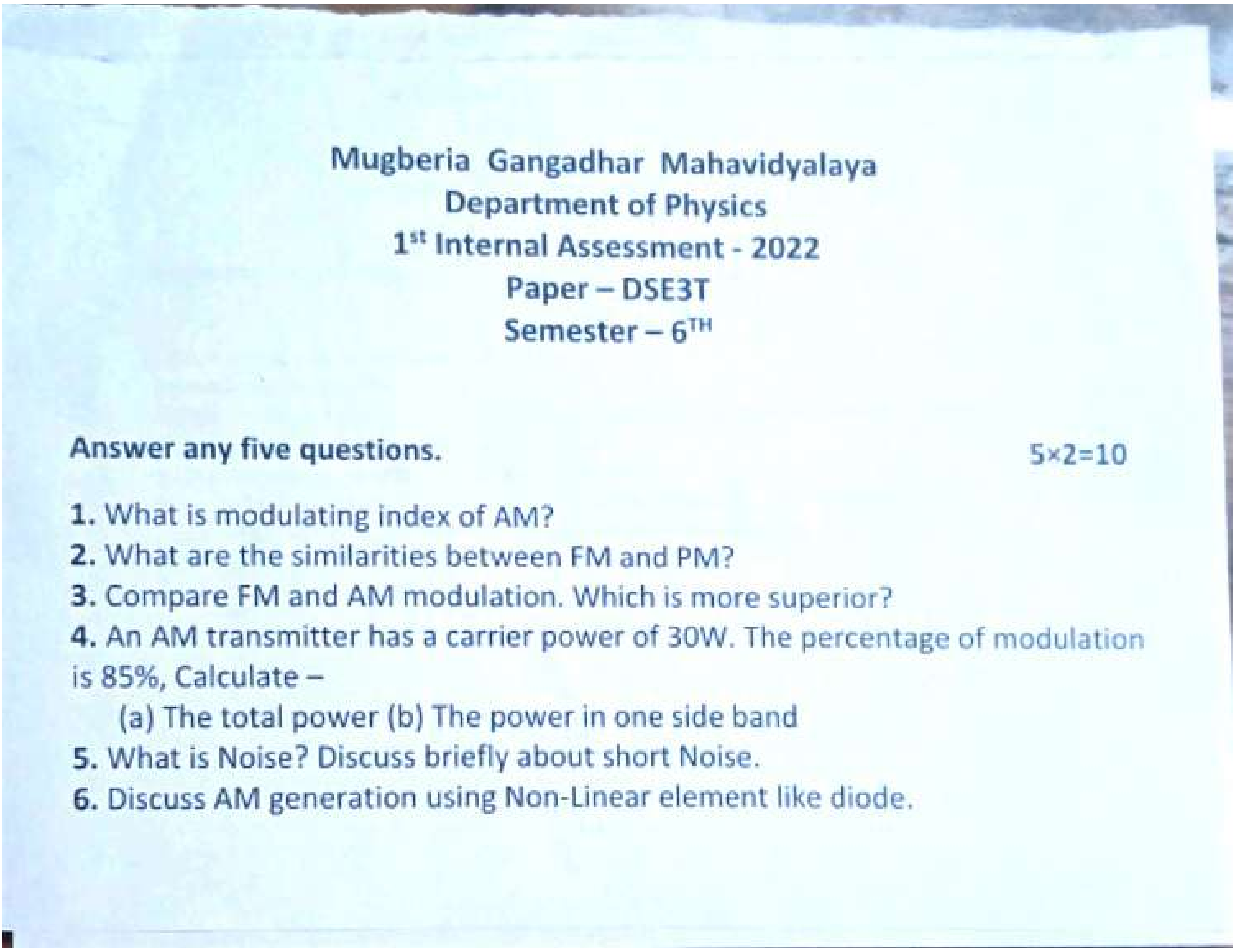


Mugberia Gangadhar Mahavidyalaya

Department of Physics

1st Internal Assessment - 2022

Paper – DSE3T

Semester – 6TH

Answer any five questions. 5×2=10

1. What is modulating index of AM?

2. What are the similarities between FM and PM?

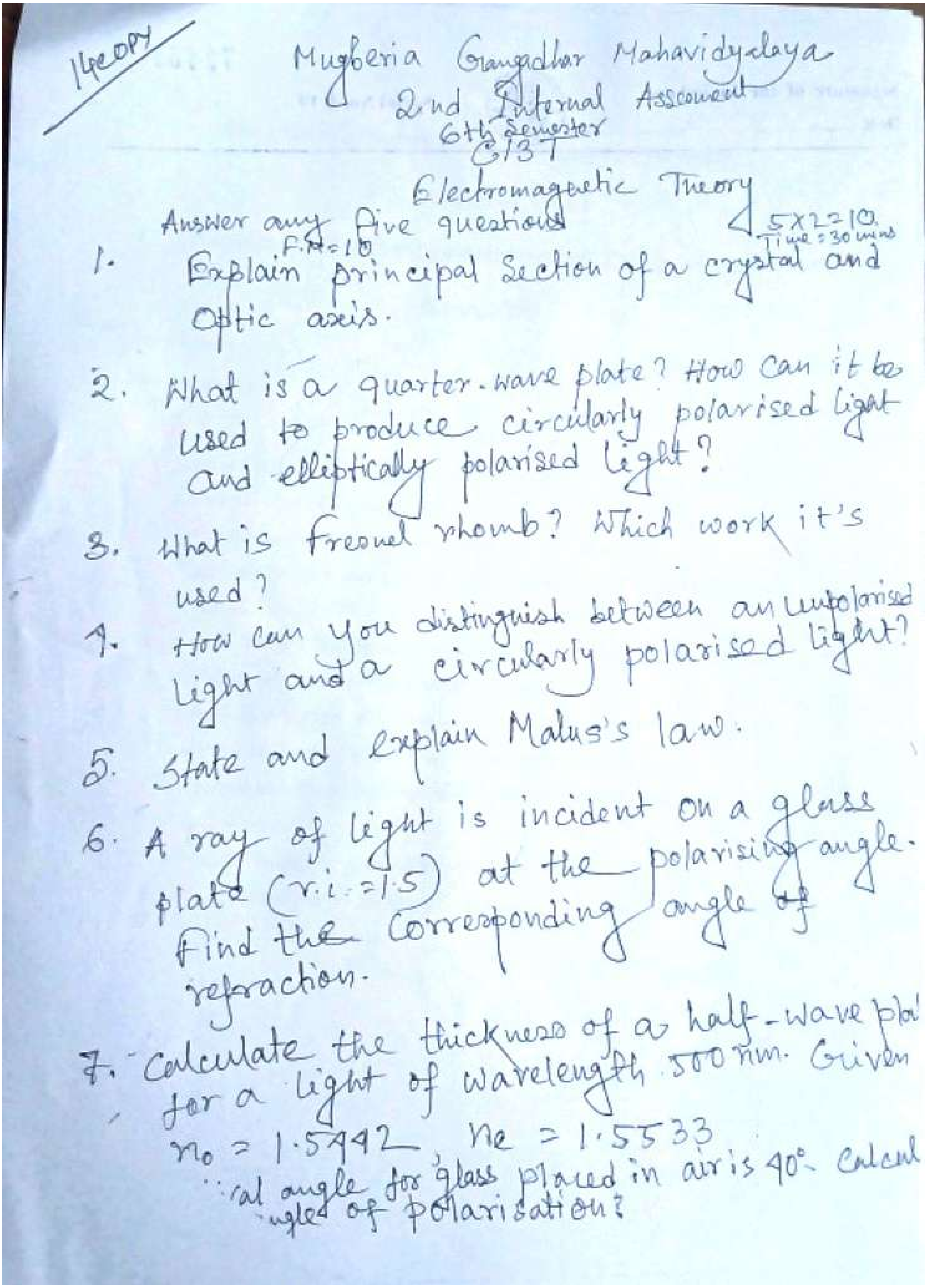
3. Compare FM and AM modulation. Which is more superior?

4. An AM transmitter has a carrier power of 30W. The percentage of modulation is 85%, Calculate –

(a) The total power (b) The power in one side band

5. What is Noise? Discuss briefly about short Noise.

6. Discuss AM generation using Non-Linear element like diode.



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Mugberia Gangadhar Mahavidyalaya
2nd Internal Assessment
6th Semester
C13T
Electromagnetic Theory

Answer any five questions 5X2=10
F.M=10 Time=30 mins

1. Explain principal Section of a crystal and Optic axis.

2. What is a quarter-wave plate? How can it be used to produce circularly polarised light and elliptically polarised light?

3. What is fresnel rhomb? Which work it's used?

4. How can you distinguish between an unpolarised light and a circularly polarised light?

5. State and explain Malus's law.

6. A ray of light is incident on a glass plate (r.i.=1.5) at the polarising angle. Find the corresponding angle of refraction.

7. Calculate the thickness of a half-wave pla for a light of wavelength 500 nm. Given $n_o = 1.5442$, $n_e = 1.5533$

ral angle for glass placed in air is 40°. Calcul ngles of polarisation?

Mugberia Gangadhar Mahavidyalaya

2nd Internal Test

Paper-DSE 4T (Experimental Technique)

Sem –vi

Time-30min **full marks-10**

Answer any five **5×2**

1. Give the physical significance of Knudsen number. What is its value for molecular state of a system.
2. Define the unit of pressure 'torr'. 1 torr = …….. mbar.
3. What is the average speed of Nitrogen molecule at 300^0C (molecular mass of N_2=28, R=8.314J/K).
4. If mean free path for Nitrogen molecule is 64 mm at 10^{-3} mbar then what will be its mean free path at pressure 0.3 mbar.
5. How many collisions will a Nitrogen molecule have in one second at a pressure of 0.1 mbar. (given λ at 0.1 mbar pressure is 0.64 mm).
6. Define the term molecular impingement rate. Relate it to molecular density (only relation).
7. Why turbo molecular pumps are called momentum transfer pump.
8. Write down the phases of Rotary Vane pump.

Mugberia Gangadhar Mahavidyalaya

1st Internal Assessment (2022)

Semester - IV

Electricity &Magnetism (GE-4)

Time- 40 minutes **Full Marks-10**

Answer any five questions. *2X5=10*

1. What do you mean by polar and axial vectors?
2. Show that gradΦ is a vector perpendicular to the surface $\Phi(x,y,z)=C$ where C is a constant ?
3. Show that "If closed line integral of a field vector ($\vec{A}$) vanishes ,then it is the gradient of a field scalar($\boldsymbol{\Phi}$)".
4. Show that electrostatic field is conservative in nature.
5. Does a magnetic field do any work on a moving charge ?
6. From Biot-Savart law in vector form , Show that 'Isolated magnetic monopole does not exist.'
7. The magnetic vector potential $\vec{A}$ is difined by $\vec{B}=\vec{\nabla}X\vec{A}$. Show that A satisfies the equation $\nabla^2\vec{A}=-\mu_0\vec{J}$, provided $\vec{\nabla}.\vec{A}=0$, $\vec{J}$ being the current density.
8. What is equation of continuity in electromagnetism and give the physical significance of it's?
9. What is displacement current? Why is displacement current called a current?

Mugberia Gangadhar Mahavidyalaya

Department of Physics

Paper Name: Quantum Mechanics and applications Practical (C11P)

Full Marks: 20

Group A

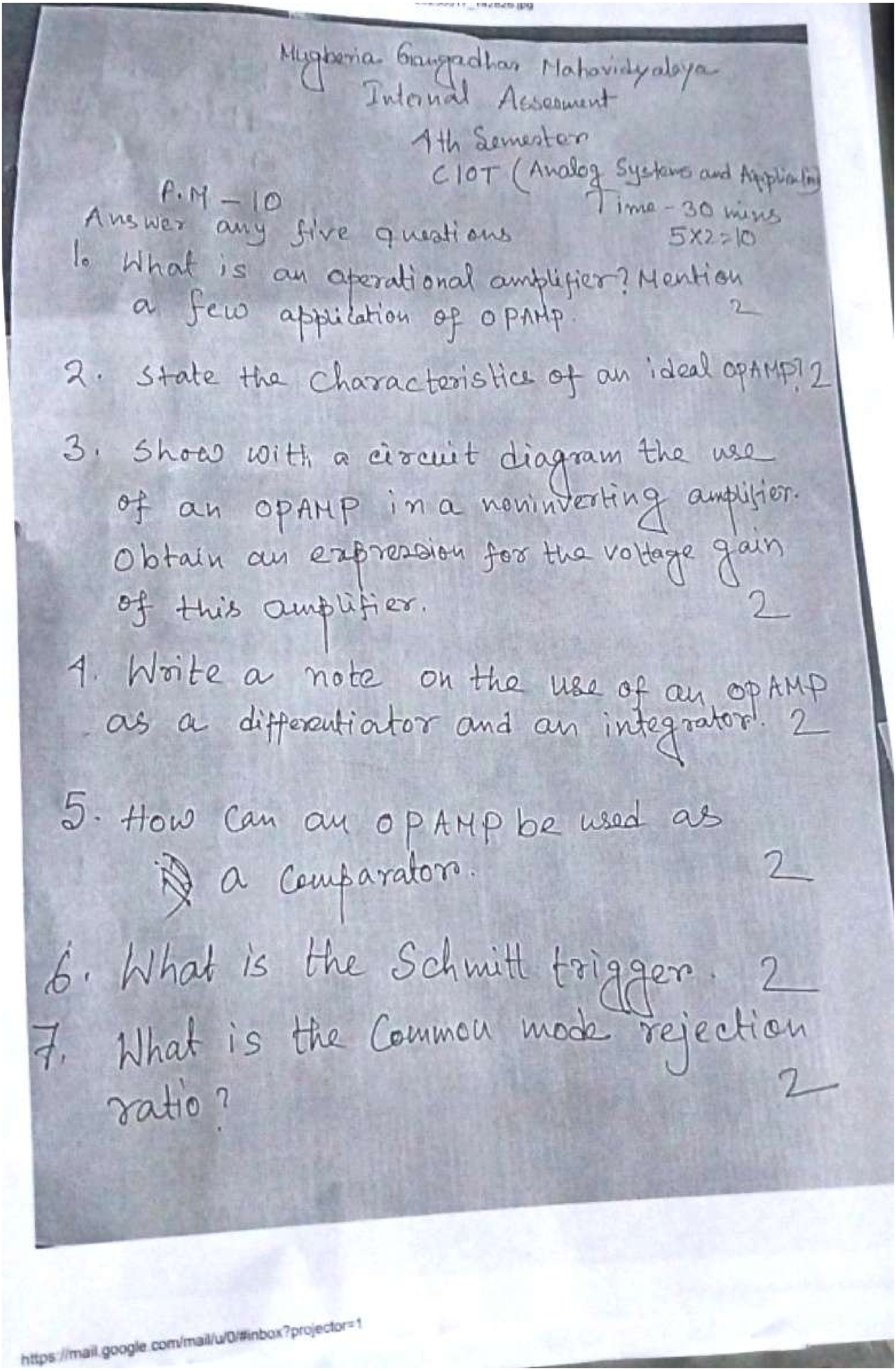
1. To show the tunneling effect in tunnel diode using I-V characteristics. (brief theory, data table, graph) (8)

Group B

(Answer any one question from the following)

1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom. (7)
2. Solve the s-wave radial Schrodinger equation for an atom for the screened coulomb potential. (7)
3. Solve the s-wave radial Schrodinger equation for a particle of mass m, for an harmonic oscillator potential. Plot wave functions. (7)

[LNB 2, Viva –Voce 3]



Mugberia Gangadhar Mahavidyalaya
Internal Assessment
4th Semester
C10T (Analog Systems and Applica

F.M - 10
Time - 30 mins

Answer any five questions 5×2=10

1. What is an operational amplifier? Mention a few application of OPAMP. 2

2. State the Characteristics of an ideal OPAMP? 2

3. Show with a circuit diagram the use of an OPAMP in a noninverting amplifier. Obtain an expression for the voltage gain of this amplifier. 2

4. Write a note on the use of an OPAMP as a differentiator and an integrator. 2

5. How can an OPAMP be used as a comparator. 2

6. What is the Schmitt trigger. 2

7. What is the Common mode rejection ratio? 2

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1st Internal Assessment 2023
Department of Physics
Mugberia Gangadhar Mahavidyalaya

Semester: IV

Paper: SEC-2 (Basic Instrumental Skill)

Full Marks 10

Time: 30 Minutes

Answer any five questions (Each question has 2 marks)

1) Define Accuracy.
2) Define Precision.
3) Define Sensitivity.
4) Define Resolution.
5) What is the loading effect in electrical measurement instrument?
6) What is random error?
7) Define systematic error.

Mugberia Gangadhar Mahavidyalaya
Intenal Assesment
4th Semester
C10T (Analog Systems and Applicatin

F.M – 10 Time – 30 mins

Answer any five questions 5×2=10

1. What is an operational amplifier? Mention a few appilcation of OPAMP. 2

2. state the Characteristics of an ideal opAMP? 2

3. Show with a circuit diagram the use of an opAMP in a noninverting amplifier. Obtain an expression for the voltage gain of this amplifier. 2

4. Write a note on the use of an opAMP as a differentiator and an integrator. 2

5. How can an OPAMP be used as a comparator. 2

6. What is the Schmitt trigger. 2

7. What is the Common mode rejection ratio? 2

Mugberia Gangadhar Mahavidyalaya

1st Internal Test (Sem.-IV)

Course - GE4T (Electricity and Magnetism)

Full marks- 10

Time - 30min

Answer any five

5×2

1) Show that electric field due to point charge is conservative in nature (consider Field $\vec{E} = Kq/r^2\ \hat{r}$).
2) If electric field in a region is $\vec{E} = 5x\ \hat{\imath} + 6y\ \hat{\jmath} + 3z\ \hat{k}$ V/m. $\epsilon_0 = 8.854 \times 10^{-12}$ c²/N.m² then find volume charge density.
3) Proof the differential form of Gauss's theorem in electrostatics.
4) If electric field for an infinitely long wire at a distance 3 meter is 8 N/C then find field at a distance of 4cm from the wire.
5) What do you mean by Eddy current? Write down its two applications.
6) If induced emf of a coil is 10mV due to change in current of a coil is 0.2A per second the find the self inductance of the coil.
7) Find the gradient of $f(x,y,z) = e^x \text{Sin}(y) \log(z)$.
8) If electrostatic potential $f = xyz$ then find force on an electron placed at point (2,0,2).
9) Draw the variation of electric field for a charged conducting solid sphere and uniformly charged solid sphere with distance.

Mugberia Gangadhar Mahavidyalaya

1st Internal assessment, Department of Physics

Subject: Physics, Paper: Wave and Optics (DSC-1D, CC-4)

Answer any five question **Time: 30 Minutes** **Full Mark: (5*2=10)**

1. What is the result of superposing two collinear harmonic oscillators with the same frequency and phase?
2. Describe the motion of two collinear harmonic oscillators when they are superposed with a phase difference of 180 degrees.
3. How does the amplitude of the resulting motion change when two collinear harmonic oscillators with different amplitudes are superposed?
4. What is the result of superposing two perpendicular harmonic oscillators with the same frequency and phase?
5. Describe the motion of two perpendicular harmonic oscillators when they are superposed with a phase difference of 90 degrees.
6. How does the amplitude of the resulting motion change when two perpendicular harmonic oscillators with different amplitudes are superposed?
7. Write the superposition principal.

1. একই সংখ্যক ফ্রিকোয়েন্সি এবং ফেজ সহিত দুটি কলাইনিয়ার হারমোনিক অসিলেটর সুপারপোজ করার ফলাফল কী?
2. ১৮০ ডিগ্রি পেশাদারী ফেজ সহিত যখন দুটি কলাইনিয়ার হারমোনিক অসিলেটর সুপারপোজ করা হয়, তখন কী ধরণের চলনা ঘটে?
3. দুটি কলাইনিয়ার হারমোনিক অসিলেটর যখন ভিন্ন দৈর্ঘ্য সম্পন্ন হয়, তখন পরিণামস্বরূপ চলনার অংশের মাত্রা কীভাবে পরিবর্তিত হয়?
4. একই সংখ্যক ফ্রিকোয়েন্সি এবং ফেজ সহিত দুটি অলম্পীয় হারমোনিক অসিলেটর সুপারপোজ করার ফলাফল কী?
5. ৯০ ডিগ্রি পেশাদারী ফেজ সহিত যখন দুটি অলম্পীয় হারমোনিক অসিলেটর সুপারপোজ করা হয়, তখন কী ধরণের চলনা ঘটে?
6. দুটি অলম্পীয় হারমোনিক অসিলেটর যখন ভিন্ন দৈর্ঘ্য সম্পন্ন হয়, তখন পরিণামস্বরূপ চলনার অংশের মাত্রা কীভাবে পরিবর্তিত হয়?
7. সুপারপোজন সিদ্ধান্ত লিখুন।

Mugberia Gangadhar Mahavidyalaya

1st Internal assessment (4th semester)

PHYSICS

Paper - cc(9) : Elements of Modern Physics.

Full Marks ⇒10 Time = 30min

⊙ Answer any five question. $2\times5=10$

1.) Calculate the binding energy in MeV of 4He form the following data

Mass of 4He = 4.003875 u
" " 1H = 1.008145 u
" " neutron = 1.008985 u.

2.) Find the expression of the α- disintegration energy.
Where, m_α = mass of α particle.
m_d = " " daughter nucleus.

3) Give the properties of neutrino,

4.) What are the process by which γ-rays loses energy when passing through matter ?

5.) Calculate the reaction energy Q Liberated in the following reaction, using B.E per nucleon of Li7 is 5.61 MeV and that of He^4 is 7.06 MeV

$${}_3Li^7 + {}_1H^1 \longrightarrow 2\,{}_2He^4.$$

Mugberia Gangadhar Mahavidyalaya

2nd Internal Test (Sem.-IV)

Course-C9T (Nuclear Physics)

Full marks- 10 Time -30min

Answer any five

1. Prove that eigen values of hermitian operator are real.
2. Write down the conditions of acceptable quantum mechanical wave function.
3. A photon has energy 10eV. Calculate its wavelength.
4. Explain the non existence of electrons inside the nucleus.
5. If dispersion relation is $\omega = \sqrt{(gK)}$,where g is constant. Then find the relation between phase velocity and group velocity.
6. Explain the physical outcome of Davisson Germer experiment.
7. What do you mean by ultraviolet catastrophe?
8. Find the probability current density of $\psi(x) = U(x)$
9. Draw the curve for $|\psi_1|^2$ and $|\psi_2|^2$ with distance. Where ψ_1 and ψ_2 are the ground stat and 1st excited state of one dimensional infinite potential of width L.

Mugberia Gangadhar Mahavidyalaya
2nd Internal Assesment
Semester - 4th
Subject - physics(H)
Paper - 10T

F.M - 10 Time - 45 mi

Answer any five questions:-

a) What do you mean by the quiescent point of a transistor amplifier?

b) what is a load line?

c) Explain the ~~the~~ term transistor biasing?

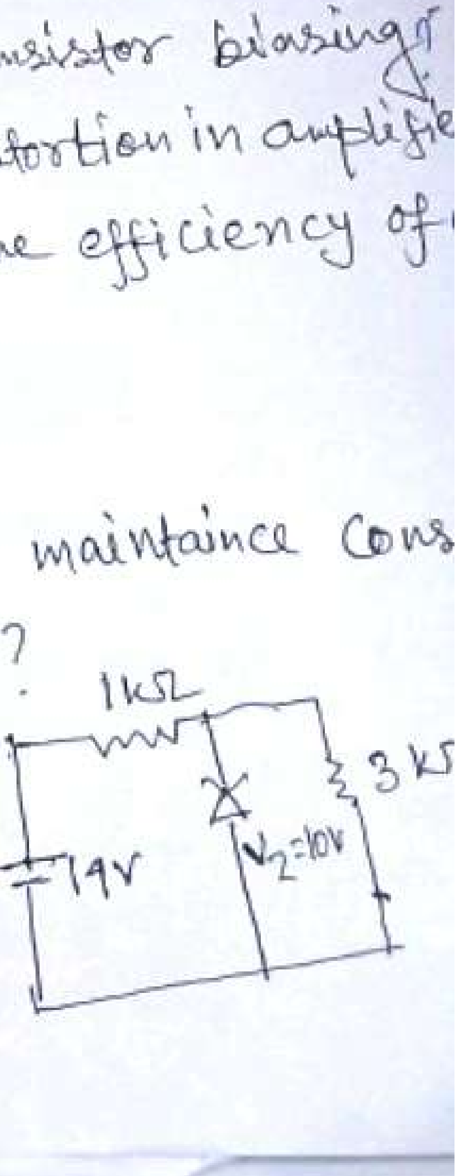
d) What do you mean by distortion in amplifie

e) Derive an expression for the efficiency of half wave rectifier?

f) What is ripple factor?

g) Explain how gener diode maintaince Cons voltage across the load?

h) In the Circuit shown in the figure ~~each~~ is Zener diode in the on or off State?



Date- 30/0
1:00 pm

1st Internal Assessment 2023
Department of Physics
Mugberia Gangadhar Mahavidyalaya

Semester: IV

Paper: SEC-2 (Basic Instrumental Skill)

Full Marks 10

Time: 30 Minutes

Answer all the questions

1. What is a multimeter? How is it used as a voltmeter? 1+2
2. Draw the block diagram of an AC millivoltmeter . Write down its specification and their significance. 2+2
3. How is the electrostatic focusing achieved in CRT? Explain it with the help of a diagram.

me - 1:30 PM

Mugberia Gangadhar Mahavidyalaya

2^{nd} Internal assessment, Department of Physics

Subject: Physics, Paper: Wave and Optics (DSC-1D, CC-4)

Answer any five question **Time: 30 Minutes** **Full Mark: (5*2=10)**

1. Explain the Huygens Principle.
2. Write down the condition of interference.
3. Drive the relation between phase velocity and group velocity.
4. The average power transmitted through a given point on a string supporting a sine wave is 0.20 W when the amplitude of the wave is 2.0 mm. What power will be transmitted through this point if the amplitude is increased to 3.0 mm.
5. Write a note on Electromagnetic nature of light.
6. A pipe 20 cm long is closed at one end. Which harmonic mode of the pipe is resonantly excited by a 430 Hz source ? Will the same source be in resonance with the pipe if both ends are open? (speed of sound in air is 340 m s-1).

Mugberia Gangadhar Mahavidyalaya

2nd Internal test

Time : 1 hr | GE-4T | Mark - 10

Attempt Any five : 2 × 5 = 10

1. Find electric field due to given Potential $\phi = \frac{\vec{p}\cdot\vec{r}}{4\pi\epsilon_0 r^3}$ where $\vec{p}$ is the electric dipole moment.

2. Find the expression for Mechanical Pressure on the surface of a conductor.

3. Explain Biot-Savart law and from this deduce Ampere's circuital law for steady current.

4. Show that the divergence of the magnetic induction is always zero.

5. State and prove Poynting's theorem relating the flow of energy at a point in space in an EM field.

6. Derive the electromagnetic wave equation from Maxwell's field equations.

7. A wire of length 2 m perpendicular to X-Y plane is moved with velocity $\vec{v} = (2\hat{i} + 3\hat{j} + \hat{k})$ m/s through a region of uniform induction, $\vec{B} = (\hat{i} + 2\hat{j})$ Wb/m². Calculate the potential difference between the ends of the wire.

UG/1st Sem/PHSH/C2P/23

VIDYASAGAR UNIVERSITY

1st Semester Examination 2023

Subject : PHYSICS (Hons.)

Paper: CC2P (Mechanics lab.)

Full Marks: 20

Time: 3 Hours

The figures in the margin indicate full marks. Candidates are required to give theiranswers in their own words as far as practicable.

Distribution Marks [Experiment – 15; LNB: 02 ; Viva : 03]

Perform one experiment allotted through drawing cards.

1) To measure the external diameter of a tube by Slide callipers, Screw Gauge and Travelling microscope.

   a. Data for vernier constant and zero error of slide callipers. 1

   b. Data for diameter by slide callipers(at least five readings). 3

   c. Data for vernier constant and zero error of screw gauge. 1

   d. Data for diameter by screw gauge (at least five readings). 3

   e. Data for vernier constant of travelling microscope. 1

   f. Data for diameter by microscope (at least three readings for each of horizontal and vertical diameter). 5

   g. Compare and comment on the results 1

2) To determine the modulus of rigidity of a wire by Maxwell Needle.(masses should be provided)

   a. Working formula. 3

   b. Measure the length of the wire. 1

   c. Data for the radius of the wire by screw gauge (at least 5 readings). 3

   d. Data for time periods for solid cylinders outside and inside the needle respectively (T_1 and T_2), at least 10 oscillations. 6

   e. Calculation of rigidity modulus. 1

   f. Precaution and discussion. 1

3) To determine the value of g using Kater's pendulum.

   a. Working formula/Theory. 3

   b. Preliminary records of times of oscillations during adjustment of positions of the cylinders. 5

   c. Data for final time period T1 and T2. 2

   d. Data for the distances l_1 and l_2 . 1

   e. Calculation of g. 2

   f. Percentage of error (let standard value of g = 981cm/sec^2). 1

18/08/23

Mugberia Gangadhar Mahavidyalaya

1067619

Internal Assessment

2nd Semester

physics Honours

C3T (Electricity and Magnetism)

5X2=10

Answer any five Questions

1. State and discuss Ampere's circuital law? Calculate magnetic field in the case of a long coaxial cable? 2

2. What is Biot-Savart law? State and discuss. 2

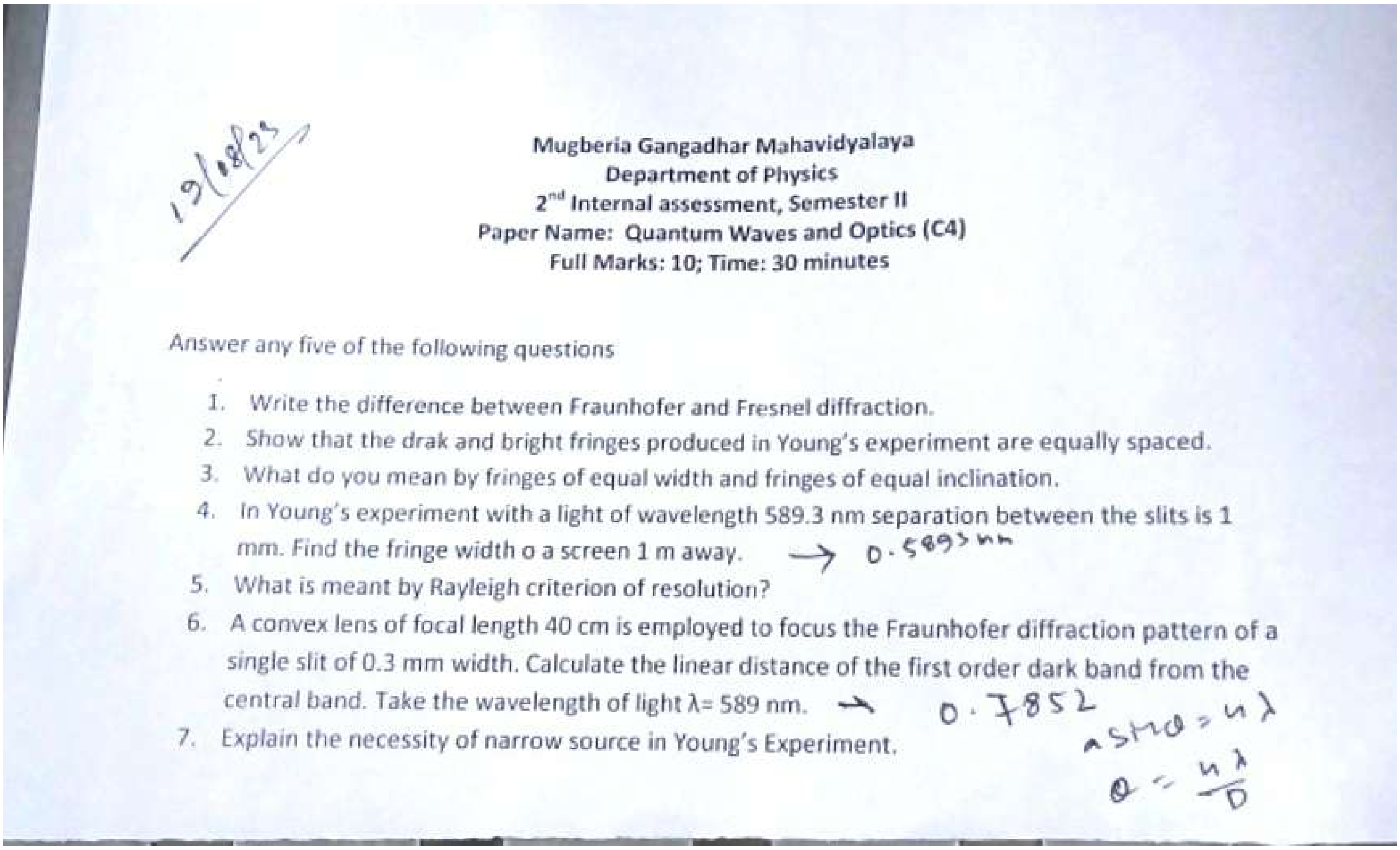
3. Calculate magnetic field due to the current in a straight wire of finite length? 2

4. What is Neumann's and Lenz's law? 2

5. Relation between Magnetic susceptibility and Magnetic intensity. What is magnetic pole density? 2

6. Establish the relation between dielectric castant and electric susceptibility? 2

7. A dielectric cylinder of radius R has a polarization $\vec{P} = Ar\hat{r}$ where r is the radial distance from the axis of the cylinder and A is a cast. Calculate the polarization charge densities! 2



19/08/23

Mugberia Gangadhar Mahavidyalaya
Department of Physics
2nd Internal assessment, Semester II
Paper Name: Quantum Waves and Optics (C4)
Full Marks: 10; Time: 30 minutes

Answer any five of the following questions

1. Write the difference between Fraunhofer and Fresnel diffraction.
2. Show that the drak and bright fringes produced in Young's experiment are equally spaced.
3. What do you mean by fringes of equal width and fringes of equal inclination.
4. In Young's experiment with a light of wavelength 589.3 nm separation between the slits is 1 mm. Find the fringe width o a screen 1 m away. → 0.5893 mm
5. What is meant by Rayleigh criterion of resolution?
6. A convex lens of focal length 40 cm is employed to focus the Fraunhofer diffraction pattern of a single slit of 0.3 mm width. Calculate the linear distance of the first order dark band from the central band. Take the wavelength of light λ= 589 nm. → 0.7852
7. Explain the necessity of narrow source in Young's Experiment.

$a \sin\theta = n\lambda$

$\theta = \frac{n\lambda}{D}$

Mugberia Gangadhar Mahavidyalaya
Department of Physics
1st Internal assessment, Semester II
Paper Name: Quantum Waves and Optics (C4)
Full Marks: 10; Time: 30 minutes

Answer any five of the following questions

1. Write the superposition principal of wave.
2. Write the Huygens Principle.
3. Write the difference between the Temporal and Spatial Coherence.
4. Drive the expression of Superposition of two collinear oscillations having equal frequencies.
5. Define the phase velocity and group velocity. Drive the relation between group velocity and phase velocity.
6. Show that the intensity for a plane progressive harmonic wave is the product of the r.m.s acoustic pressure and r.m.s particle velocity.
7. Prove that $\frac{\partial^2 \Delta}{\partial t^2} = c^2 \frac{\partial^2 \Delta}{\partial x^2}$

MUGBERIA GANGADHAR MAHAVIDYALAYA

1st Internal Assessment (1st SEM)

Paper-C2T

Answer any five question. 5×2=10

1.What is Axial modulus and it's dimension?

2.Express the Bernouli's theorem.

3.Explain Archimede's principle from the basic equation of hydrostatics.

4.Show that the equation of motion of a particle(i.e, Newton's second law)remains unchanged under a Galilean transformation.

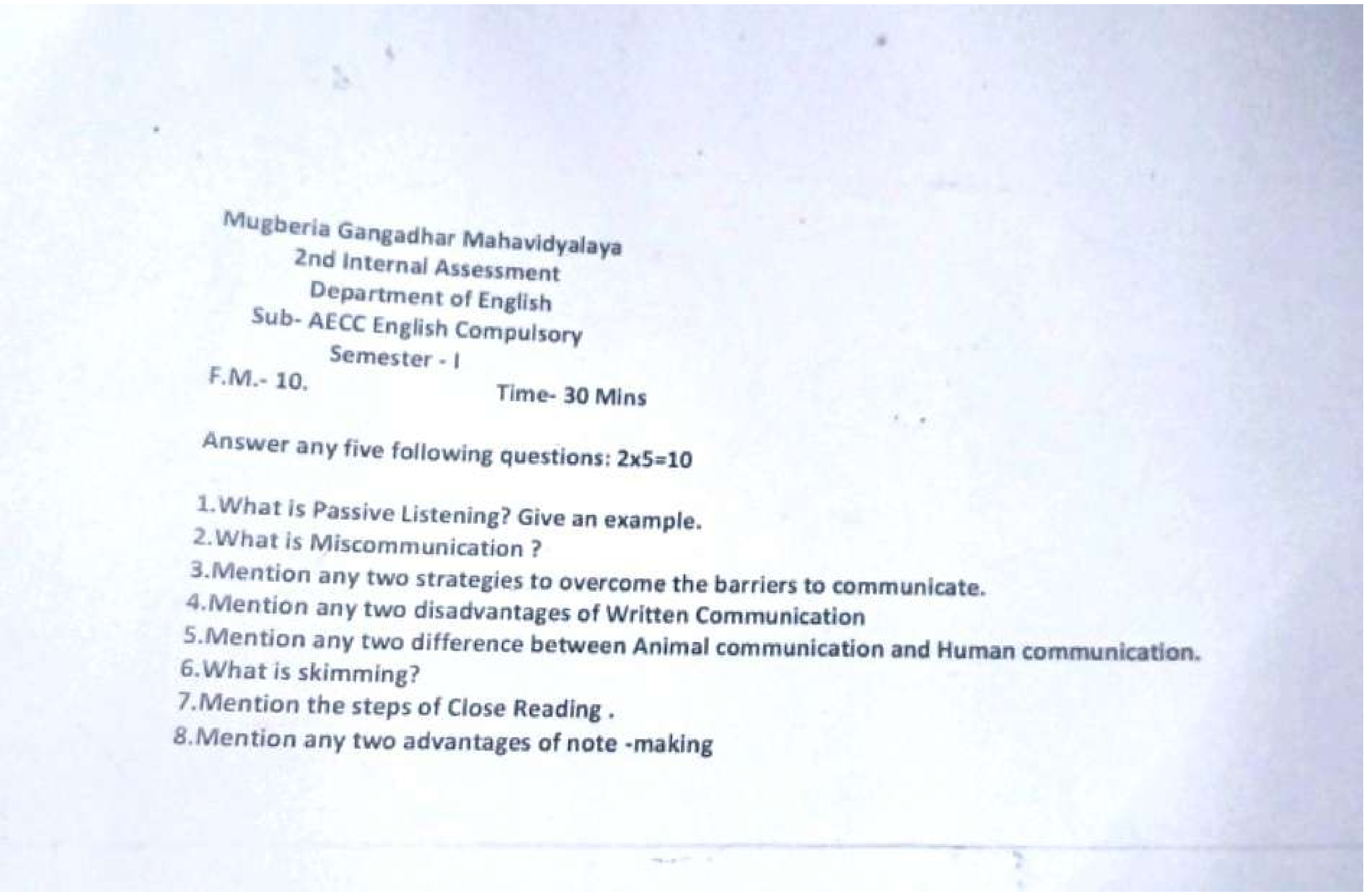
5.Show that a given system of particles has a fixed centre of mass (CM)independent of reference frame used to locate it.

6.Show that work done by a conservative force field in moving a particle along a closed path is equal to zero.

7.What are mean by the time- integral and the path-integral of a force?What information about the motion can you get from them?

8.prove that the force field

$\vec{F}=(yz-y)\hat{x} + (xz-x-1)\,\hat{y} + (xy-2z)\,\hat{z}$ is Conservative.



Mugberia Gangadhar Mahavidyalaya
2nd Internal Assessment
Department of English
Sub- AECC English Compulsory
Semester - I
F.M.- 10. Time- 30 Mins

Answer any five following questions: 2x5=10

1.What is Passive Listening? Give an example.
2.What is Miscommunication ?
3.Mention any two strategies to overcome the barriers to communicate.
4.Mention any two disadvantages of Written Communication
5.Mention any two difference between Animal communication and Human communication.
6.What is skimming?
7.Mention the steps of Close Reading .
8.Mention any two advantages of note -making

Mugberia Gangadhar Mahavidyalaya
Department of Physics
Practical Examination
Semester: I Paper: – Mathematical Physics Lab (CC1-P)

Time: 3 hours

Full Marks: 20

Distribution of Marks [Experiment – 15; LNB: 02; Viva: 03]

Group A

Answer any two Questions. (3*2=6)

1. What are functions in Python.
2. Find the output of the following:

```
L1 = [100,900,300,400,500]
START = 1
SUM = 0
for C in range(START,4):
    SUM = SUM + L1[C]
    print(C, ":", SUM)
    SUM = SUM + L1[0]*10
    print(SUM)
```

3. What are data types? What are Python's built-in core data types?

Group B

Answer any one.

9

1. Create an array with numbers: 1.2, 2.5, 5.9, 4.6, 2.4, 0.8
   Write a Python script to arrange the numbers in ascending order. (3+6)
2. Write a Python script to create a one dimensional list of 10 numbers and to find their sum and average of the numbers. (3+6)
3. Write a Python script to find the roots of following quadratic equations (9)

$x^3 - 5x + 1 = 0$

UG/1st Sem/PHSH/C2P/23

VIDYASAGAR UNIVERSITY

1st Semester Examination 2023

Subject : PHYSICS (Hons.)

Paper: CC2P (Mechanics lab.)

Full Marks: 20

Time: 3 Hours

The figures in the margin indicate full marks. Candidates are required to give theiranswers in their own words as far as practicable.

Distribution Marks [Experiment – 15; LNB: 02 ; Viva : 03]

Perform one experiment allotted through drawing cards.

1) To measure the external diameter of a tube by Slide callipers, Screw Gauge and Travelling microscope.

   a. Data for vernier constant and zero error of slide callipers. 1

   b. Data for diameter by slide callipers(at least five readings). 3

   c. Data for vernier constant and zero error of screw gauge. 1

   d. Data for diameter by screw gauge (at least five readings). 3

   e. Data for vernier constant of travelling microscope. 1

   f. Data for diameter by microscope (at least three readings for each of horizontal and vertical diameter). 5

   g. Compare and comment on the results 1

2) To determine the modulus of rigidity of a wire by Maxwell Needle.(masses should be provided)

   a. Working formula. 3

   b. Measure the length of the wire. 1

   c. Data for the radius of the wire by screw gauge (at least 5 readings). 3

   d. Data for time periods for solid cylinders outside and inside the needle respectively (T_1 and T_2), at least 10 oscillations. 6

   e. Calculation of rigidity modulus. 1

   f. Precaution and discussion. 1

3) To determine the value of g using Kater's pendulum.

   a. Working formula/Theory. 3

   b. Preliminary records of times of oscillations during adjustment of positions of the cylinders. 5

   c. Data for final time period T1 and T2. 2

   d. Data for the distances l_1 and l_2 . 1

   e. Calculation of g. 2

   f. Percentage of error (let standard value of g = 981cm/sec^2). 1

UG/1st Sem/PHSH/C2P/23

VIDYASAGAR UNIVERSITY

1st Semester Examination 2023

Subject : PHYSICS (Hons.)
Paper: CC2P (Mechanics lab.)

Full Marks: 20

Time: 3 Hours

The figures in the margin indicate full marks. Candidates are required to give theiranswers in their own words as far as practicable.

Distribution Marks [Experiment – 15; LNB: 02 ; Viva : 03]

Perform one experiment allotted through drawing cards.

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Mugberia Gangadhar Mahavidyalaya

2nd Internal Test,2022

Sem.-III (pure pass)

Course- C-6T (Thermal Physics)

Full marks- 10 **Time -30min**

Candidates are required to give their answer in their own words as far as practicable.

Q. Answer any five questions. **2X5=10**

1. What is Entropy ? Gives the physical concept of Entrpy.

2. Calculate $\Delta S_{universe}$ for reversible isothemal expansion of perfect gas.

3. **U=U(T,V)** is a state function , then show that **dQ= dU + PdV** is not an exact differential .

4. Define mean free path and Write down it's expression.

5. Describe the total degrees of freedom for monatomic and diatomic molecules

6. Show that 'W'(work done) is a path function.

7. State the Clausius' theorm on entropy and write the combined equation of 1st and 2nd laws of thermodynamics.

8. Find the specific heat of the process P=a/T for a monatomic gas, a being constant.

Department of Physics, Mugberia Gangadhar Mahavidyalaya
12^{nd} Internal Assessment-2022

Paper Name: GE-3 (Solid State Physics)
Semester-III

Full Marks 10 — Answers any 5 questions. (5×2 =10)

1. Show that, in a long wavelength limit, the velocity of sound is independent of frequency.
2. What is the forbidden frequency band ? show that the width of this band depends on the mass ratio M/m.
3. What is the cut off frequency for a linear monatomic lattice if the atomic spacing (a) is 1A and velocity of sound is 330 m/s at 0 o C.
4. Show that 'A monatomic linear lattice behaves as a low pass mechanical filter.'
5. What is Bragg law?
6. What is the Brillouin zone?
7. The primitive translation vector of a two-dimensional lattice are

$$a = 2\hat{i} + \hat{j}\ ,\ b = 2\hat{j}$$

Determine the primitive translation vectors of its reciprocal lattice.

Department of Physics, Mugberia Gangadhar Mahavidyalaya

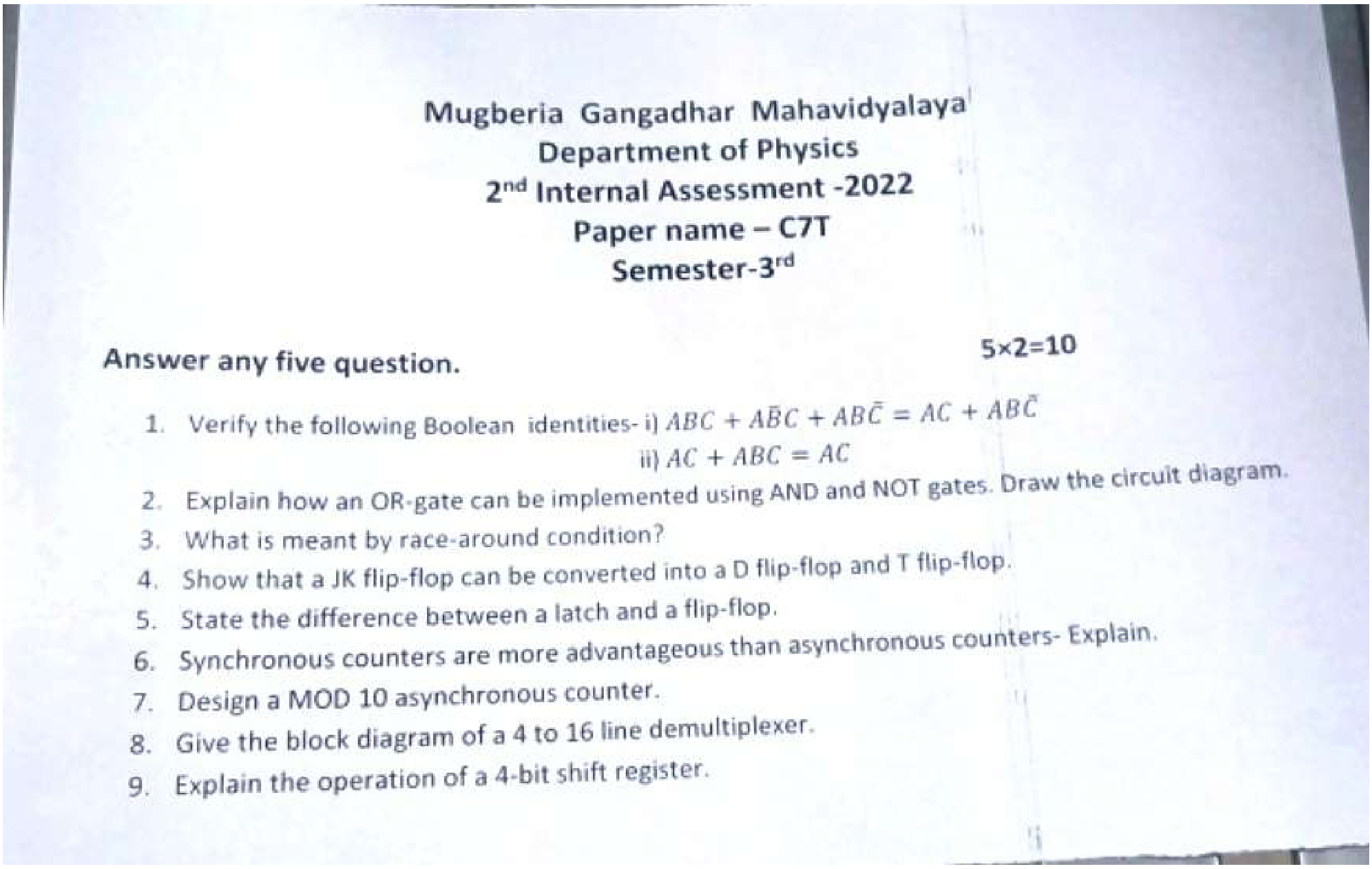
2nd Internal Assessment-2022

Paper Name: SEC1T

Semester-III

Full Marks 10 **Answers any 5 questions. (5 X 2=10)**

1. What is capacitive rectance.
2. Give the V-I Characteristics of Zener Diode.
3. Draw the half wave rectifier and full wave rectifier using diode.
4. What is a single-phase motor?
5. An inductor of 2H is connected to a circuit at a frequency of 50Hz. Find the inductive reactance.
6. Why does capacitor block DC?
7. Give the symbol of schottky and SCR?



Mugberia Gangadhar Mahavidyalaya
Department of Physics
2nd Internal Assessment -2022
Paper name – C7T
Semester-3rd

Answer any five question. $5\times2=10$

1. Verify the following Boolean identities- i) $ABC + A\bar{B}C + AB\bar{C} = AC + AB\bar{C}$
   ii) $AC + ABC = AC$
2. Explain how an OR-gate can be implemented using AND and NOT gates. Draw the circuit diagram.
3. What is meant by race-around condition?
4. Show that a JK flip-flop can be converted into a D flip-flop and T flip-flop.
5. State the difference between a latch and a flip-flop.
6. Synchronous counters are more advantageous than asynchronous counters- Explain.
7. Design a MOD 10 asynchronous counter.
8. Give the block diagram of a 4 to 16 line demultiplexer.
9. Explain the operation of a 4-bit shift register.

Mugberia Gangadhar Mahavidyalaya

UG 2nd Internal Assessment (2022-23)

Paper-DSE2T (Nuclear & Particle Physics)

Semester-V

Full Marks-10 **Time-30min**

Answer any Five

1. What do you mean by Dead Time of a detector.
2. Define Resolution of a detector
3. Explain the act of Photomultiplier Tube in Scintillation Detector.
4. Explain the working principle of semiconductor detector.
5. How Current mode is used as the mode of detection..
6. Explain the meaning of the terms: boson, fermion, hadron, lepton, baryon
7. Compare the "Q" value in β^+ and β^- decay process
8. Match the reactions on the left with the associated interactions on the right.

(1) $\pi^+ \rightarrow \mu^+ + \nu_\mu$	(i) Strong
(2) $\pi^0 \rightarrow \gamma + \gamma$	(ii) Electromagnetic
(3) $\pi^0 + n \rightarrow \pi^- + p$	(iii) Weak

Department of Physics, Mugberia Gangadhar Mahavidyalaya
2nd Internal Assessment-2022

Paper Name: Mathematical Physics-II (C5)
Semester-III

Full Marks 10 Answers any 5 questions. (5X2 =10)

1. Identify and classify the singular points of $x^2(1-x^2)^2y'' + x(1+x)^2y' + (1-x)y = 0$
2. If f(x) = x can be expanded as Fourier series in (−π, π). Find a_0.
3. Find the PDE Of all sphere whose centre lie on z- axis and given by equation $x^2 + y^2 + (x-a)^2 = b^2$.
4. Form the partial differential equations form: Z=$f(x^2 + y^2)$.
5. Form the partial differential equations form: Z=$(x+a)(y+b)$
6. Integrate $\frac{d^3z}{dx^2dy} = \cos(2x+3y)$
7. Solve the following equation $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$ by the method of separation of variables.

Mugberia Gangadhar Mahavidyalaya

B.Sc. Honours Internal Assessment 2022

(Under CBCS Pattern)
Semester - V
Subject: PHYSICS

Paper: CC – 12 T

(Solid State Physics)

Full Marks: 10 **Time: 30 minutes**

Candidates are required to give their answer in their own words as far as practicable.

Q. Answer any five questions.

1. What is phonon ? Give an evidence for the existence of phonons.
2. Show that 'A monatomic linear lattice behaves as a low pass mechanical filter.'
3. Show that, in long wavelength limt, the velocity of sound is independent of frequency.
4. What is the cut off frequency for a linear monatomic lattice if the atomic spacing (a) is 1A and velocity of sound is 330 m/s at $0^{\circ}C$.
5. What is the forbidden frequency band ? show that the width of this band depends on the mass ratio M/m.
6. What is hysteresis loss. The hysteresis loss of a transformer has 2500 ergs cm^{-3} , calculate the loss of energy per hour at 50 Hz frequency . Density of iron is 7.5 gm cm^{-3} and weight is 10kg.
7. How does a free electron gas differ from an ordinary gas ?
8. Atomic radius of sodium is 1.86 A. Claculate the Fermi energy of sodium at absolute zero

Mugberia Gangadhar Mahavidyalaya

UG 2nd Internal Assessment (2022-23)

Paper-DSE2T (Nuclear & Particle Physics)

Semester-V

Full Marks-10

Time-30min

Answer any Five

1. What do you mean by Dead Time of a detector.
2. Define Resolution of a detector
3. Explain the act of Photomultiplier Tube in Scintillation Detector.
4. Explain the working principle of semiconductor detector.
5. How Current mode is used as the mode of detection..
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(3) $\pi^0 + n \rightarrow \pi^- + p$	(iii) Weak

Mugberia Gangadhar Mahavidyalaya
Internal Assesment
Semester - VI
Paper - 12T

$5 \times 2 = 10$

Answer any five questions

① What is the Bloch function?

② What is forbidden energy gap?

③ Give the order of band gap for a metal, a Semiconductor and an insulator?

④ What is the failure of free electron theory?

⑤ What happened when $p \to \infty$?

⑥ plot the graph $\frac{P}{\alpha a} \sin \alpha a + \cos \alpha a$ with αa!

MUGBERIA GANGADHAR MAHAVIDYALAYA

CLASS - 3rd SEM

SUB - SEC (1).

A.) Answer Any Ten 1×10 = 10

1.) The property of a conductor due to which it passes current is called - ⓐ resistance ⓑ reluctance ⓒ conductance ⓓ inductance.

2.) The rating of a fuse wire is always expressed in - ⓐ amp-hour ⓑ amp-volt ⓒ kWh ⓓ amp

3.) An ideal voltage source should have -
ⓐ large value of e.m.f ⓑ small value of e.m.f ⓒ Zero source resistance
ⓓ infinite source resistance.

4.) Which of the following is non linear circuit parameter ?
ⓐ Inductance ⓑ condenser ⓒ wire wound resistor. ⓓ Transistor.

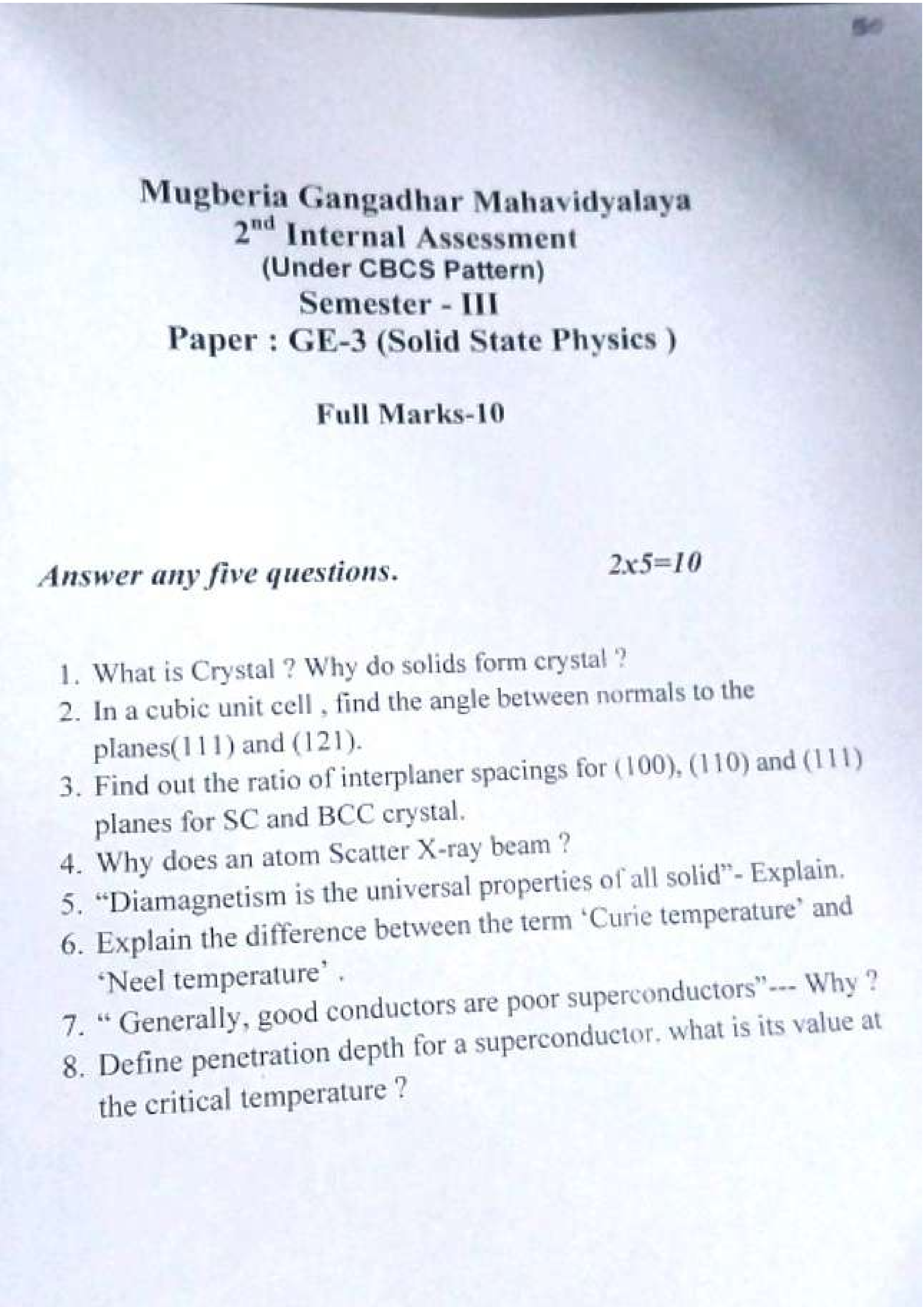
5.) Lamination's of core are generally made of -
ⓐ case iron ⓑ carbon ⓒ Silicon steel.
ⓓ stainless steel.

Mugberia Gangadhar Mahavidyalaya
1st Internal Assessment
Semester - II
Electricity & Magnetism (C-3)

Time- 30 minutes **Full Marks-10**

Answer any five questions. *2x5=10*

1. Show that electrostatic field is conservative in nature.
2. The Electric field in xy-plane is given by $\vec{E}=2ax\hat{i}+by\hat{j}$ where a and b are constants. What is the charge density responsible for this field ?
3. State Earnshaw's theorem and What is its importance?
4. Consider a line of infinite extent along Z-axis with a line charge density $\lambda(z)=\lambda_0\, e^{-z^2/a^2}$, where λ_0 and a are constants. Find the total charge of the distribution.
5. Does a magnetic field do any work on a moving charge ?
6. From Biot-Savart law in vector form , Show that 'Isolated magnetic monopole does not exist.'
7. An electron of charge e is rotating n times per sec around the nucleus in a circular orbit of radius a . Find the magnetic field $\vec{B}$ at the position of the nucleus. If, a= 5.1×10^{-11} m and n=6.8×10^{15} times/sec, calculate the value of $\vec{\mathbf{B}}$.
8. Verify that magnetic vector potential $\vec{A}$ due to uniform magnetic field $\vec{B}$ is given by $\vec{\mathbf{A}}=-1/2(\vec{\mathbf{r}}\times\vec{\mathbf{B}})$.



Mugberia Gangadhar Mahavidyalaya

2nd Internal Assessment

(Under CBCS Pattern)

Semester - III

Paper : GE-3 (Solid State Physics)

Full Marks-10

Answer any five questions. *2x5=10*

1. What is Crystal ? Why do solids form crystal ?
2. In a cubic unit cell , find the angle between normals to the planes(111) and (121).
3. Find out the ratio of interplaner spacings for (100), (110) and (111) planes for SC and BCC crystal.
4. Why does an atom Scatter X-ray beam ?
5. "Diamagnetism is the universal properties of all solid"- Explain.
6. Explain the difference between the term 'Curie temperature' and 'Neel temperature' .
7. " Generally, good conductors are poor superconductors"--- Why ?
8. Define penetration depth for a superconductor. what is its value at the critical temperature ?

Mugberia Gangadhar Mahavidyalaya

Department of physics

1st Internal Assessment -2022

Paper name –SEC

Semester-3rd

Answer any five question. 5×2=10

1. What is Potentiometer?
2. Explain the term 'Mobility' and its S.I unit?
3. A galvanometer coil has a resistance of 15Ω and gives full-scale deflection for a current of 4 mA. Convert it to an ammeter of range 0 to 6 A.
4. Two electric bulbs P and Q have their resistances in the ratio of 1: 2. They are connected in series across a battery. Calculate what will be the ratio of the power dissipation in these bulbs.
5. Find the potential difference across the whole terminals for given cell which has an emf of 5.0 volt and also an internal resistance of 1.0 volt. Cell terminals are joined through a 9 Ω resistor.
6. The shunt required to send 10% of the main current through a moving coil galvanometer of resistance 99Ω is...

Mugberia Gangadhar Mahavidyalaya

B.Sc. Honours Internal Assessment 2022

(Under CBCS Pattern)
Semester - V
Subject: PHYSICS
Paper: CC – 12 T
(Solid State Physics)

Full Marks: 10 **Time: 30 minutes**

Candidates are required to give their answer in their own words as far as practicable.

Q. Answer any five questions.

1. What is Packing Efficiency? What are its values for sc, bcc, fcc, and hcp structure ?
2. The density of bcc iron is 7.9 gm/cm^3 and its atomic weight is 56. Calculate the length of the side of the cubic unit cell and the nearest neighbour distance.
3. "X-rays are most useful for crystal analysis and ordinary visible light is not Bragg-reflected "----Explain
4. An x-ray beam of wave length 0.71 A is diffracted by a cubic KCL crystal of density 1.99x10^3 kg/m^{-3}. Calculate the inter planar spacing for (200) planes and the glancing angle for the second order reflection form these planes. The molecular weight of KCL is 74.6 amu and the Avogadro's number is 6.023x10^{26} kg^{-1}mole^{-1}.
5. Why diamagnetic substances has negative temperature independent susceptibility ?
6. What is ferromagnetic curie temperature ? Why does ferromagnetic becomes paramagnetic above curie temperature ?
7. Give two hypothesis based on Weiss Theory of Ferromagnetism.
8. A magnetic field of 2x10^3 mks units produces a flux of 3x10^{-5} wb in a bar of iron of cross section 0.2cm^2 . Derive the permeability and susceptibility of the specimen.

Mugberia Gangadhar Mahavidyalaya

UG 1st internal Assessment (2022-23)

Paper-C11T (Quantum Mechanics & Application)

Semester-V

Time-30min

Full Marks-10

Answer any Five

1. Define the term Space Quantisation.
2. Find the expectation value of energy when the state of harmonic oscillator is described by the following wave function $\psi(x,t) = 1/\sqrt{2}\,[\psi_0(x,t) + \psi_1(x,t)]$
3. Prove that $[L_x , L_y] = i\hbar L_z$
4. Determine the possible terms of an one electron atom corresponding to n=3.
5. Find the angle between **L** and **S** vectors for the term $^2D_{5/2}$.
6. What is probability current density.
7. Discuss the experimental evidence in support of electron spin.
8. What is Normal Zeeman Effect.
9. Find the expectation value of kinetic energy on ground state of H atom.
10. Why it is needed inhomogeneous magnetic field.

15

Mugberia Gangadhar Mahvidyalaya

2nd Internal Assessment

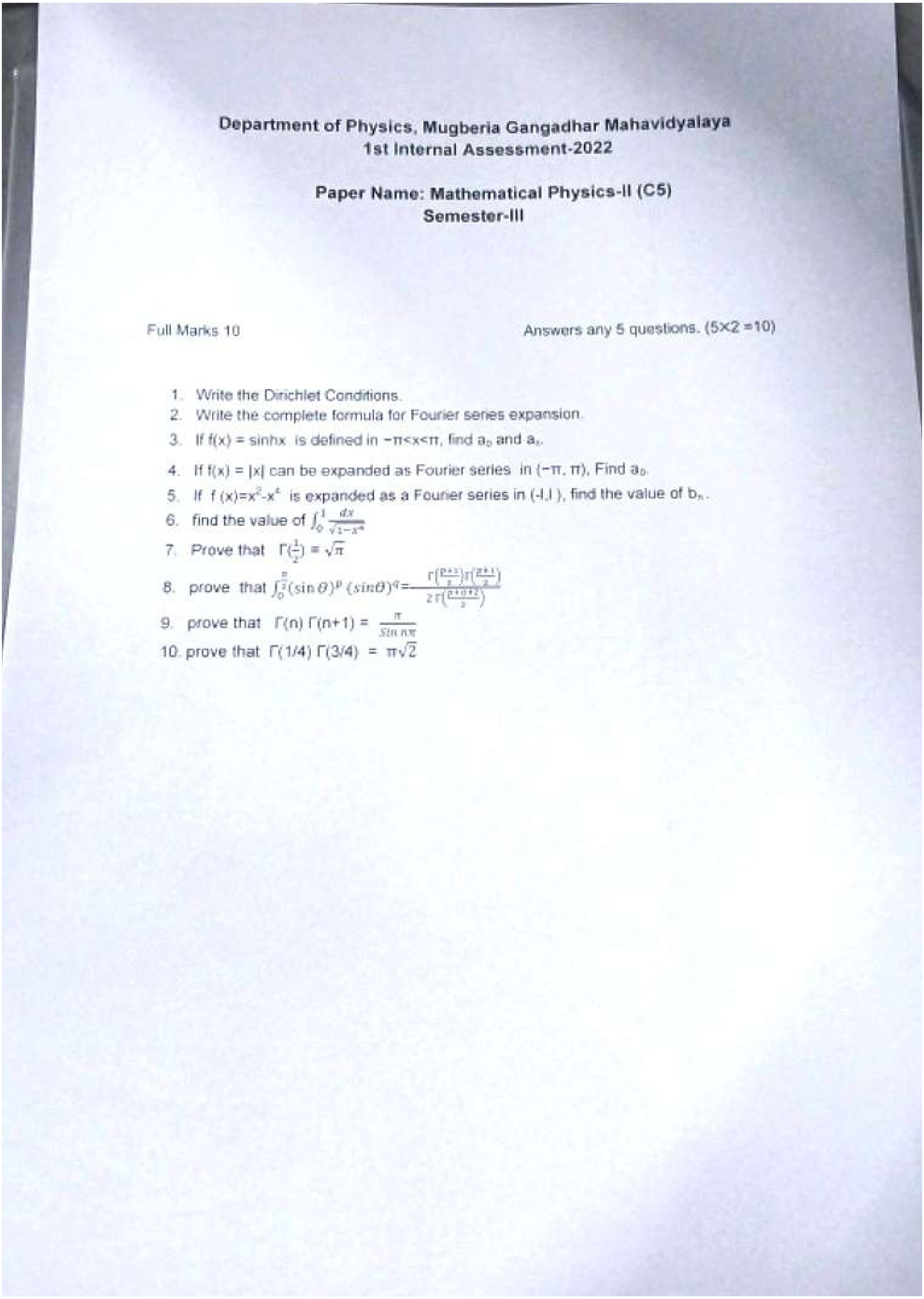
Sem-1st

Paper- C2 (Mechanics)

Full Marks-10

Answer any five 2×5

1. A particle execute S.H.M. of period 10 sec. and amplitude 5 cm. What will be the maximum amplitude of velocity?
2. Two cylinders have the same length and mass and are made of same material; one is solid while the other which is hollow has an external radius twice the internal radius. What will be the Ratio of tortional rigidites of the two cylinder.
3. What are the conservation laws are applicable to elastic collision.
4. What will be the value of Poisson's ratio of a material when the value of rigidity modulus is 8X10^11 N/m^2 and Young modulus is 20X10^11 N/m^2 ?
5. A satellite moves around a planet in a circular orbit at a distance R from its centre. The time period of revolution of the satellite is T . If the same satellite is taken to an orbit of radius 4R around the same planet, what will be its time period.
6. What will be the direction of coriolis force in northern and southern hemi sphere.
7. Two photons recede from each other. What will be Their relative velocity .
8. At what velocity kinetic energy of a body is 3 times its rest energy?



Department of Physics, Mugberia Gangadhar Mahavidyalaya
1st Internal Assessment-2022

Paper Name: Mathematical Physics-II (C5)
Semester-III

Full Marks 10 Answers any 5 questions. (5×2 =10)

1. Write the Dirichlet Conditions.
2. Write the complete formula for Fourier series expansion.
3. If $f(x) = \sinh x$ is defined in $-\pi<x<\pi$, find a_0 and a_n.
4. If $f(x) = |x|$ can be expanded as Fourier series in $(-\pi, \pi)$, Find a_0.
5. If $f(x)=x^2-x^4$ is expanded as a Fourier series in $(-l,l)$, find the value of b_n.
6. find the value of $\int_0^1 \frac{dx}{\sqrt{1-x^n}}$
7. Prove that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$
8. prove that $\int_0^{\frac{\pi}{2}}(\sin\theta)^p\,(\sin\theta)^q = \frac{\Gamma(\frac{p+1}{2})\Gamma(\frac{q+1}{2})}{2\Gamma(\frac{p+q+2}{2})}$
9. prove that $\Gamma(n)\,\Gamma(n+1) = \frac{\pi}{\sin n\pi}$
10. prove that $\Gamma(1/4)\,\Gamma(3/4) = \pi\sqrt{2}$

Mugberia Gangadhar Mahavidyalaya
Department of Physics
1st Internal Assessment - 2022
Paper - DSE-1
Semester - 5th

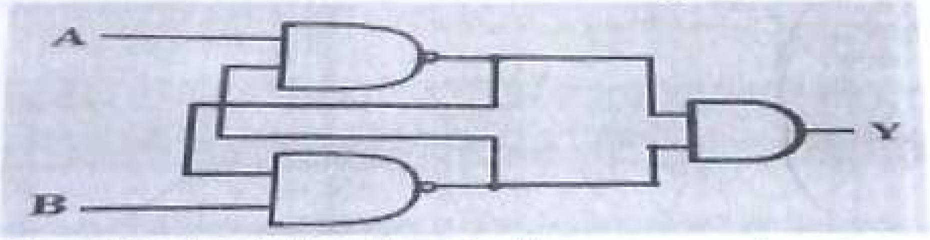
Answer any five questions. **5×2=10**

1. What is Generalised coordinate?
2. Write the expression for the force F acting on a charged particle of charge 'q', moving with a velocity V in the presence of both electric field E and magnetic field B. Obtain the condition under which the particle moves undeflected through the fields.
3. What is holonomic constraint? Give one example?
4. State two postulates of Special theory of Relativity.
5. Derive Lorentz space time transformation equations for two inertial frames.
6. From Lorentz-Einstein Transformation equations, explain -
   (i) Length Contraction
   (ii) Time dilation
7. A rod has a length of 1 meter. When the rod is in a satellite moving with respect to earth at a speed 0.99c, what is its length as determined by an observer in the satellite?
8. The lifetime of an unstable particle at rest is 10^{-3}s. If the instant of creation, it moves with a creation, it moves with a speed of 0.9c, what is the distance it will traversed before decaying.
9. An electron is moving with a speed of 0.8c in a direction opposite to that of a moving photon. Calculate the relative velocity of the photon with respect to the electron.

Mugberia Gangadhar Mahavidyalaya
Department of Physics
1st Internal Assessment - 2022
Paper – C7T
Semester – 3rd

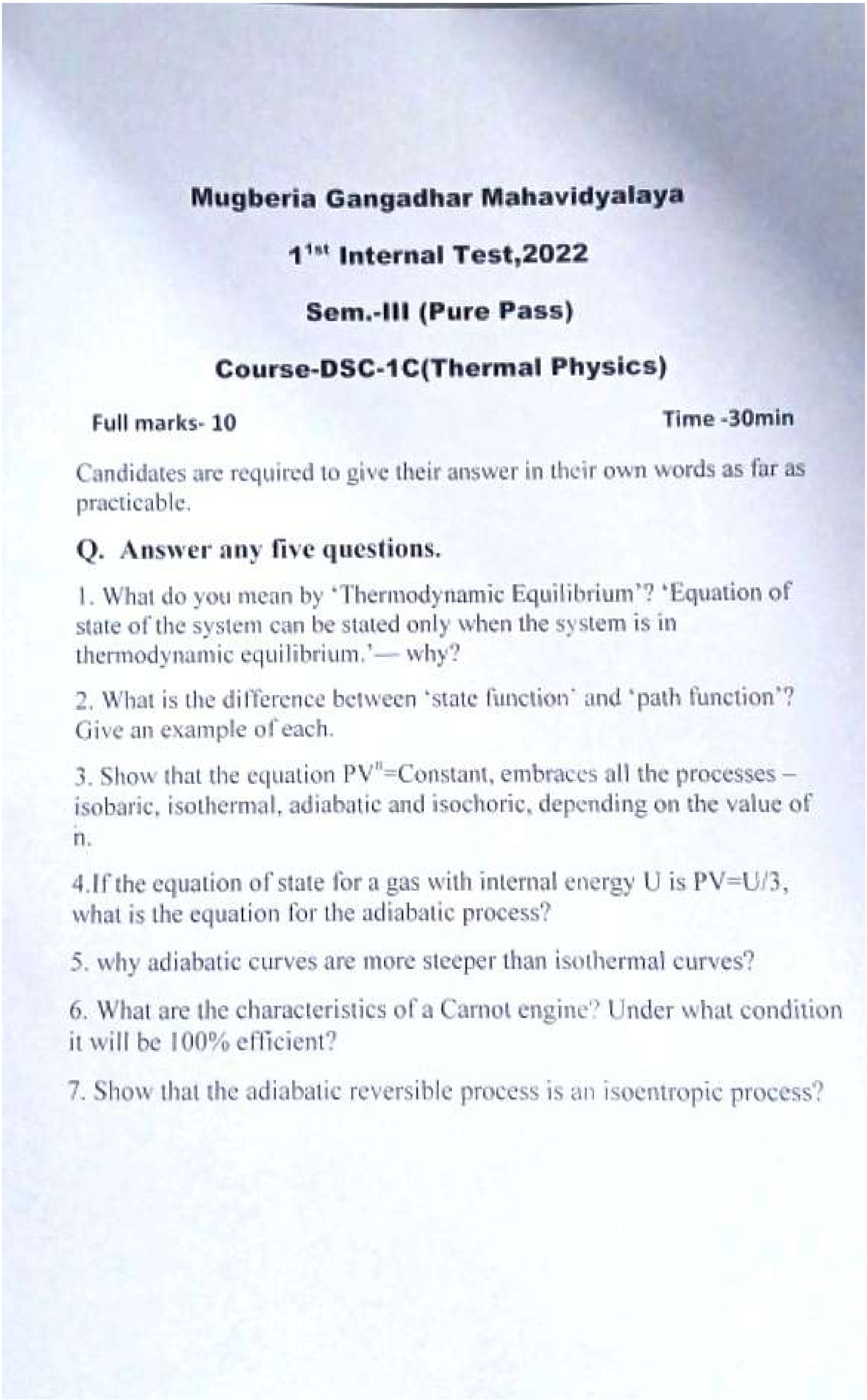
Answer any five questions. 5×2=10

1. Explain with example – (a) active components (b) passive components
2. What are the various advantages of integrated circuits over discrete circuits?
3. Convert $(126.375)_{10}$ into its equivalent binary number.
4. Convert the binary number $(110100111010011)_2$ to its octal number.
5. Convert the hex number $(3B55F0)_{16}$ to its equivalent binary number.
6. Describe the function of an odd parity checker system using XOR gates for a 4-bit input word 1110.
7. Obtain XNOR gate using NAND gates only.
8. Write truth tables for the following logic circuit.



9. Simplify the following Boolean expression by using K-map–

$Y = AB\bar{C} + \bar{A}\bar{B}C + A\bar{B}\bar{C} + \bar{A}B\bar{C}$



Mugberia Gangadhar Mahavidyalaya

1st Internal Test,2022

Sem.-III (Pure Pass)

Course-DSC-1C(Thermal Physics)

Full marks- 10 **Time -30min**

Candidates are required to give their answer in their own words as far as practicable.

Q. Answer any five questions.

1. What do you mean by 'Thermodynamic Equilibrium'? 'Equation of state of the system can be stated only when the system is in thermodynamic equilibrium.'— why?

2. What is the difference between 'state function' and 'path function'? Give an example of each.

3. Show that the equation PV^n=Constant, embraces all the processes – isobaric, isothermal, adiabatic and isochoric, depending on the value of n.

4.If the equation of state for a gas with internal energy U is PV=U/3, what is the equation for the adiabatic process?

5. why adiabatic curves are more steeper than isothermal curves?

6. What are the characteristics of a Carnot engine? Under what condition it will be 100% efficient?

7. Show that the adiabatic reversible process is an isoentropic process?

Department of Physics, Mugberia Gangadhar Mahavidyalaya
1st Internal Assessment-2022

Paper Name: Solid State Physics (GE3)
Semester-III

Full Marks 10

Answers any 5 questions. (5×2 =10)

1. Write down the difference between Amorphous and Crystalline Materials.
2. Calculate the packing fraction for BCC unit cell.
3. Draw the (111) planeof a cubic crystal .
4. A certain crystal has lattice parameters of 4.24, 10 and 3.66 Å on X, Y, Z axes respectively. Determine the Miller indices of a plane having intercepts of 2.12, 10 and 1.83 Å on the X, Y and Z axes.
5. What are Bravais lattices?
6. "Diamagnetism is the universal properties of all solid"- Explain.
7. Prove that the magnetic moment due to orbital motion of an electron is equal to the integral multiple of (eh/4πm).
8. The permeability of the magnetic material is measured to be 0.12 TA^{-1} . Find the relative permeability and susceptibility.
9. Explain the difference between the term 'Curie temperature' and 'Neel temperature'

1. নিরাকার এবং স্ফটিক পদার্থের মধ্যে পার্থক্য লিখ।
2. BCC ইউনিট সেলের জন্য প্যাকিং ভগ্নাংশ গণনা করুন।
3. একটি ঘন স্ফটিকের (111) plane আঁকুন।
4. একটি নির্দিষ্ট স্ফটিকের X, Y, Z অক্ষে যথাক্রমে 4.24, 10 এবং 3.66 Å এর জালি পরামিতি রয়েছে। X, Y এবং Z অক্ষে 2.12, 10 এবং 1.83 Å ইন্টারসেপ্ট সহ একটি সমতলের মিলার সূচকগুলি নির্ধারণ করুন।
5. Bravais lattices কি?
6. "ডায়াম্যাগনেটিজম হল সমস্ত কঠিনের সার্বজনীন বৈশিষ্ট্য"- ব্যাখ্যা কর।
7. প্রমাণ করুন যে একটি ইলেকট্রনের কক্ষপথের গতির কারণে চৌম্বকীয় মুহূর্ত (eh/4πm) এর অখণ্ড গুণের সমান।
8. চৌম্বকীয় উপাদানের ব্যাপ্তিযোগ্যতা 0.12 TA^{-1} হিসাবে পরিমাপ করা হয়। আপেক্ষিক ব্যাপ্তিযোগ্যতা এবং সংবেদনশীলতা খুঁজুন।
9. 'Curie temperature' and 'Neel temperature' মধ্যে পার্থক্য ব্যাখ্যা কর

Department of Physics, Mugberia Gangadhar Mahavidyalaya
1st Internal Assessment-2022

Paper Name: Mathematical Physics-II (C5)
Semester-III

Full Marks 10

Answers any 5 questions. (5×2 =10)

1. Write the Dirichlet Conditions.
2. Write the complete formula for Fourier series expansion.
3. If $f(x) = \sinh x$ is defined in $-\pi<x<\pi$, find a_0 and a_n.
4. If $f(x) = |x|$ can be expanded as Fourier series in $(-\pi, \pi)$. Find a_0.
5. If $f(x)=x^2-x^4$ is expanded as a Fourier series in $(-l,l)$, find the value of b_n.
6. find the value of $\int_0^1 \frac{dx}{\sqrt{1-x^4}}$
7. Prove that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$
8. prove that $\int_0^{\frac{\pi}{2}} (\sin\theta)^p\,(\sin\theta)^q = \frac{\Gamma\left(\frac{p+1}{2}\right)\Gamma\left(\frac{p+1}{2}\right)}{2\,\Gamma\left(\frac{p+q+2}{2}\right)}$
9. prove that $\Gamma(n)\,\Gamma(n+1) = \frac{\pi}{\sin n\pi}$
10. prove that $\Gamma(1/4)\,\Gamma(3/4) = \pi\sqrt{2}$

Mugberia Gangadhar Mahavidyalaya

UG 2nd Internal Assessment (2022-23)

Paper-C11T (Quantum Mechanics & Application)

Semester-V

Full Marks-10 **Time-30min**

Answer any Five (Put Tick [√] on the right answer)

1) Under the **L-S** coupling scheme, the possible spectral terms for the electronic configuration **2S3S** are

a) $2S_{1/2}, 2P_{1/2}, 2P_{3/2}$ **b)** $1S_0, 2S_{1/2}$ **c)** $1S_0\ 3S_1$ **d)** $3S_1, 3S_0$

2) The Lande g factor for the $^3P_1$ level of an atom is

a) 1/2 **b)** 3/2 **c)** 5/2 **d)** 7/2

3) In Zeeman Effect, a spectral line, upon the application of magnetic field, splits into more than three components because of…

a) Energy levels split into 2j+1

b) In magnetic field $\Delta m_j = 0, +1, -1$ no longer hold.

c) Variation of g factor from one level to another.

d) None of the above.

4) The total no of Zeeman components observed in an electronic transition $^2D_{5/2} \longrightarrow {}^2P_{3/2}$ of an atom in a weak magnetic field is…

a) 4 b) 6 c) 10 d) 12

5) If **L** is the angular momentum operator in quantum mechanics, the value of **L**× **L** will be

a) 0 b) ih**L** c) $[L]^2$ d) h**L**

6) In a central force field , the angular part of the solution of the Schrodinger equation is in general

a) Independent of Θ and ϕ b) A constant

b) A Spherical harmonics d) A Bessel function

Name: ……………………………………………………………Roll No:………………………………

Mugberia Gangadhar Mahavidyalaya

B.Sc. Honours Internal Assessment 2022

(Under CBCS Pattern)
Semester - V
Subject: PHYSICS

Paper: CC – 12 T

(Solid State Physics)

Full Marks: 10 **Time: 30 minutes**

Candidates are required to give their answer in their own words as far as practicable.

Q. Answer any five questions.

1. What is phonon ? Give an evidence for the existence of phonons.
2. Show that 'A monatomic linear lattice behaves as a low pass mechanical filter.'
3. Show that, in long wavelength limt, the velocity of sound is independent of frequency.
4. What is the cut off frequency for a linear monatomic lattice if the atomic spacing (a) is 1A and velocity of sound is 330 m/s at 0°C.
5. What is the forbidden frequency band ? show that the width of this band depends on the mass ratio M/m.
6. What is hysteresis loss. The hysteresis loss of a transformer has 2500 ergs cm^{-3} , calculate the loss of energy per hour at 50 Hz frequency . Density of iron is 7.5 gm cm^{-3} and weight is 10kg.
7. How does a free electron gas differ from an ordinary gas ?
8. Atomic radius of sodium is 1.86 A. Claculate the Fermi energy of sodium at absolute zero