
	B. L. D. E. Association's S. B. ARTS AND K. C. P. SCIENCE COLLEGE, VIJAYAPUR DEPARTMENT OF PHYSICS		
First Internal Assessment Test - July-2024			
Semester: II	Subject: Physics (Electricity & Magnetism)	Code: 21BSC2C2PHY1L	
Date: 09/07/2024	Time: 9.30 am to 10.20 am	Max. Marks: 30	
Q. No. I	Answer any three of the following Questions.		2×3=6M
a)	State Coulomb's law with its expression.		
b)	What are Dielectric materials? Write its types.		
c)	Write the relation between three magnetic vectors B, H and M.		
d)	What is Magnetization?		
Q. No. II	Answer the following Questions.		12×1=12M
a)	State Gauss Law. Obtain an expression for electric field due to charge distribution with i) spherical ii) cylindrical symmetry. (8M)		
b)	Find the potential at the center of a 1m square having charges q, -2q, 3q & 2q at its corners.(q=1×10 ⁻⁸ C) (4M)		
OR			
c)	Explain the importance of B-H curve of the magnetic materials with neat diagram. (8M)		
d)	Mention the types of magnetic materials and give an example for each. (4M)		
Q.No. III	Answer the following Questions.		12×1=12M
a)	Derive an expression for capacitance of i) Parallel plate capacitor ii) Cylindrical capacitor iii) Spherical capacitor filled with dielectric material. (8M)		
b)	A Cable has a wire of radius 1mm & it is surrounded by a thin metallic sheet of radius 6mm.the space between the cable & the sheet is filled with a material of dielectric constant 2.05. What is the capacitance of 8km length cable? (4M)		
OR			
c)	Derive an expression for the energy stored in a magnetic field. (8M)		
d)	Write differential forms of Maxwell's equations. (4M)		



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First Internal Assessment July-2024

Semester: IV

Subject: Thermal Physics and Electronics.

Code: 21BSC4C2PHY4L

Date: 09/07/2024

Time: 9.30 am to 10.20 am

Max. Marks: 30

Q. No. I.

Answer any Three of the following Questions

2×3=6

a) Define system and surrounding in Thermodynamics.

b) Define refrigeration and co-efficient of performance.

c) Define forbidden energy gap.

d) Define potential barrier.

Q. No II

Answer the following Questions

12×1=12

a) Write a note on T-S diagram.

(8 M)

b) Calculate the change in entropy when 5 Kg of water at 100 °C is converted into steam at same temperature? (Given: Latent heat of steam = 540 Cal/gram). **(4 M)**

OR

c) Derive an expression for work done during the isothermal process and adiabatic process. **(8 M)**

d) State Kelvin-Planck statement and Clausius statement for second law of thermodynamics. **(4 M)**

Q. No. III

Answer the following Questions

12×1=12

a) Explain forward and reverse biased characteristics of P-N junction diode. **(8 M)**

b) Explain intrinsic semiconductor. **(4 M)**

OR

c) Explain full wave center taped rectifier with circuit diagram. **(8 M)**

d) Write the comparison between center tapped rectifier and bridge rectifier. **(4 M)**



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First Internal Assessment July-2024

Semester: VI

**Subject: DSC9-Elements of Condensed
Matter & Nuclear Physics**

Code:21BSC6C6PHY1L

Date: 10/07/2024

Time: 1.40 pm to 2.30 pm

Max. Marks: 30

Q. No. I

Answer any three of the following Questions

2×3=6

a)

What is Weidman-Franz law?

b)

What is Fermi Energy?

c)

What are the two important Hypotheses about the actual constituents of the nucleus?

d)

Mention two constituent particles of the nucleus.

Q. No. II

Answer the following Questions

12×1=12

a)

Derive an expression for electrical conductivity of a metal based on Classical Free Electron Theory (CFET). (8 Marks)

b)

Mention any four failures of Classical Free Electron Theory (CFET). (4 Marks)

OR

c)

Discuss the dependence of Fermi Factor $f(E)$ (i.e., Fermi –Dirac Distribution Function) on temperature ($T = 0\text{ K}$ and $T > 0\text{ K}$) and energy ($E > E_F$ and $E < E_F$). (8 Marks)

d)

The electrical and thermal conductivity of Silver at 293 K are 6.22×10^7 SI unit and 423 SI unit, respectively. Calculate the Lorentz number. (4 Marks)

Q.No. III

Answer the following Questions

12×1=12

a)

Describe theory of Proton - Neutron Hypothesis. (8 Marks)

b)

Explain in brief about Nuclear Size/Radius. (4 Marks)

OR

c)

Explain Main features of Binding Energy versus Mass Number curve. (8 Marks)

d)

Write a note on Nuclear Density. (4 Marks)



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First Internal Assessment July-2024

Semester: VI

**Subject: Electronic instrumentation and
Sensors**

Code: 21BSC6C6PHY2L

Date: 13/07/2024

Time: 1.40 pm to 2.30 pm

Max. Marks: 30

Q. No. I. Answer any Three of the following Questions

2×3=6

- a) What is single phase and three phase power supply?
- b) Define ripple factor and peak inverse voltage of rectifier.
- c) What is periodic function?
- d) State Dirchlet's conditions.

Q. No II Answer the following Questions

12×1=12

- a) What are characteristics of AC power supply? **(8 M)**
- b) Write the difference between AC and DC power supply. **(4 M)**
- OR**
- c) Discuss the construction and working of Bridge rectifier. **(8 M)**
- d) What is L- type filter and π - type filter. **(4 M)**

Q. No. III Answer the following Questions

12×1=12

- a) Expand periodic function in a series of sine and cosine functions and hence determine its coefficients. **(8 M)**
- b) Find the half – range sine series of $f(x)=1$ in $[0,1]$. **(4 M)**

OR

- c) State and prove properties of Laplace transform. **(8 M)**
- d) Find the Laplace transform of $f(t)=t^2$ using the transform of derivative. **(4 M)**



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Second Internal Assessment August-2024

Semester: II

Subject: Physics DSC Electricity & Magnetism

Code: 21B5C5C5PHY2L

Date: 06/08/2024

Time: 09.30 am to 10.30 am

Max. Marks: 30

Q. No. I

Answer any three of the following Questions.

2×3=6

a) State ampere's circuital law with expression.

b) Write the properties of magnetic field lines.

c) State Kirchhoff's law.

d) What is Ballistic Galvanometer?

Q. No. II

Answer the following Questions.

12×1=12

a) State Biot sarvart's law. Derive the expression for magnetic field i)at a point due to long straight conductor carrying current ii)at a point along the axis of a circular coil carrying current. 8M

b) Calculate the M.F due to a circular coil of 500 turns & radius 0.05m carrying a current of 7amp i)at a point on the axis of a coil at distant of 0.12m ii)at the center of the coil. 4M

OR

c) Explain the Measurement of High resistance by Leakage method. 8M

d) Derive the expression for growth of current in RL circuit. 4M

Q.No. III

Answer the following Questions.

12×1=12



a) Explain the Principle, Construction and working of Helmholtz Galvanometer. 8M

b) A HG having coils each of 50 turns & radius 0.1m produces a deflection of 45° . When a current of 0.1A flows through it. Calculate the horizontal component of the earth's field & reduction factor of the galvanometer. 4M

OR

c) Derive the expression for current and time period of Ballistic Galvanometer. 8M

d) Explain the Principle and Construction of Ballistic Galvanometer. 4M

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Second Internal Assessment August-2024					
Semester: IV		Subject: Thermal Physics and Electronics.		Code: 21BSC4C2PHY4L	
Date: 06/08/2024		Time: 9.30 am to 10.20 am		Max. Marks: 30	
Q. No. I.	Answer any Three of the following Questions				2×3=6
a)	State second law of thermodynamics in terms of entropy.				
b)	Define efficiency and write the expression of efficiency of heat engine.				
c)	What are feedbacks? Write the types of feedback.				
d)	Define drain resistance and write its expression.				
Q. No II	Answer the following Questions				12×1=12
a)	Write a note on Carnot heat engine. (8 M)				
b)	Find the efficiency of Carnot's engine working between the steam point and ice point. (4 M)				
OR					
c)	Discuss diesel engine and derive the expression for efficiency of diesel engine. (8 M)				
d)	A Carnot's engine whose temperature of the source is 400 K takes 200 calories of heat at this temperature and rejects 150 calories of heat to the sink. What is the temperature of sink? Also calculate the efficiency of engine. (4 M)				
Q. No. III	Answer the following Questions				12×1=12
a)	Explain the output characteristics of CB configuration. (8 M)				
b)	Write the comparison between amplifier and oscillator. (4 M)				
OR					
c)	Explain the principle and working of phase shift oscillator (8 M)				
d)	Explain LC filter. (4 M)				



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Second Internal Assessment August -2024

Semester: VI

**Subject: Electronic instrumentation and
Sensors**

Code: 21BSC6C6PHY2L

Date: 09/08/2024

Time: 1.40 pm to 2.30 pm

Max. Marks: 30

Q. No. I. Answer any Three of the following Questions

2×3=6

a) Define electronic voltage regulator.

b) What are DC ammeter and DC voltmeter?

c) What is Thermistor?

d) What is Piezo-resistive effect?

Q. No II Answer the following Questions

12×1=12

a) Write a note on Cathode Ray Oscilloscope.

(8 M)

b) Write a note on features of Cathode Ray Tube(CRT).

(4 M)

OR

c) Explain AC voltmeter using rectifier.

(8 M)

d) Write the requirements of the shunt resistance.

(4 M)

Q. No. III Answer the following Questions

12×1=12

a) What is transducer? Explain its types.

(8 M)

b) Write the factors governing the selection of transducer.

(4 M)

OR

c) Explain with neat labeled diagram construction and working of Platinum Resistance Thermometer.

(8 M)

d) Write a note on Potentiometer.

(4 M)



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Second Internal Assessment August -2024

Semester: VI

Subject: DSC9-Elements of Condensed Matter & Nuclear Physics

Code:21BSC6C6PHY1L

Date: 06/08/2024

Time: 1.40 pm to 2.30 pm

Max. Marks: 30

Q. No. I

Answer any three of the following Questions

2×3=6

a)

What is Dielectric Constant?

b)

Mention different types of polarization in dielectrics?

c)

Define Photo electric effect.

d)

Define Compton scattering.

Q. No. II

Answer the following Questions

12×1=12

a)

Deduce Clausius - Mossotti equation.

(8 Marks)

b)

An elemental solid dielectric material has polarizability $7 \times 10^{-40} \text{ Fm}^{-2}$. Calculate dielectric constant for the material having $3 \times 10^{28} \text{ atoms/m}^3$ and the internal field to be Lorentz field.

(4 Marks)

OR

c)

What is Internal Field? Obtain an expression for the internal field inside the dielectric.

(8 Marks)

d)

If a NaCl crystal is subjected to an electric field of 1000 V/m and the resulting polarization is $4.3 \times 10^{-8} \text{ C/m}^2$, calculate the dielectric constant of NaCl.

(4 Marks)

Q.No. III

Answer the following Questions

12×1=12

a)

Explain Semi-Empirical mass formula.

(8 Marks)

b)

Mention different properties of liquid drop model.

(4 Marks)

OR

c)

Explain nuclear fission on the basis of liquid drop model.

(8 Marks)

d)

Describe Pair production process.

(4 Marks)



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First Internal Assessment Jan-2024

Semester: I

**Subject: Physics DSC-1 MECHANICS
& PROPERTIES OF MATTER**

**Code:
21BSC1C1PHY1L**

Date: 03/01/2024

Time: 12.00 pm to 1.00 pm

Max. Marks: 30

Q. No. 1.	Answer any two of the following Questions.	2×3=6
a)	Write the dimensional formula for: i)force ii)pressure iii)strain iv)Ml	
b)	What is surface tension?	
c)	Define scalar & vector product with expression.	
d)	Define Velocity Gradient.	
Q. No II	Answer the following Questions	12×1=12
a)	Write a note on gradient of scalar function with its physical interpretation & significance.	8M
b)	Check the accuracy of following relation i) $E=mgh + \frac{1}{2}mv^2$ ii) $v^2 - u^2 = 2as^2$	4M
	OR	
c)	What is Capillarity? Derive an expression for the rise of liquid in a capillary tube.	8M
d)	Find the excess of pressure inside a spherical liquid drop of water of radius 1 mm, surface tension of water = 73×10^{-3} N/m.	4M
Q. No. III	Answer the following Questions	12×1=12
a)	Explain physical interpretation of divergence of vector field & mention its significance.	8M
b)	Convert a force of 1 newton to dyne & write the significance of dimensional equation.	4M
	OR	
c)	What is Coefficient of viscosity? Determine the coefficient of viscosity by using Poissulle's method.	8M
d)	Calculate the coefficient of viscosity of the given liquid when a steel ball of radius 5×10^{-4} m falls through it with terminal velocity 30 ms^{-1} . Given: density of steel ball = $7.8 \times 10^3 \text{ kg/m}^3$ and density of liquid = $0.87 \times 10^3 \text{ kg/m}^3$.	4M



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First Internal Assessment Jan-2024

Semester: III

Subject: Physics (DSC)

Code: 21BSC303PHY3

Date: 04/01/2024

Time: 4:15 pm to 5:15 pm

Max. Marks: 30

Q. No. 1.

Answer any three of the following Questions.

2×3=6

a)

Define Plane and Spherical waves.

b)

Define Superposition Principle.

c)

Define Interference of light.

d)

What are corpuscles?

Q. No II

Answer the following Questions.

12×1=12

a)

Derive an Expression for Intensity of progressive wave. (8m)

b)

Explain Laplace's correction for velocity of sound. (4m)

OR

c)

Explain analytical treatment for beats (with waxing and waning). (8m)

d)

Explain Superposition of two collinear oscillations having equal frequencies. (4m)

Q. No. III

Answer the following Questions.

12×1=12

a)

Derive an expression for fringe width by Young's double slit experiment. (8m)

b)

Write a note on Newton's corpuscular theory. (4m)

OR

c)

Derivation of expression for interference by a plane parallel film illuminated by a plane wave. (8m)

d)

Determine the wavelength by Michelson's interferometer. (4m)



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First Internal Assessment Jan-2024

Semester: III

Subject: Physics (OEC)

Code: 21BSC303PHY3

Date: 06/01/2024

Time: 1:30 pm to 2:30 pm

Max. Marks: 30

Q. No. 1.

Answer any three of the following Questions.

2×3=6

a) Define Cloud.

b) What is cloud seeding?

c) Define wind.

d) Define cyclone.

Q. No II

Answer the following Questions.

12×1=12

a) Explain formation of cyclone.(8m)

b) Write a note on clouds (4m)

OR

c) Explain formation of trade winds. (8m)

d) Write advantages of cloud seeding. (4m)

Q. No. III

Answer the following Questions.

12×1=12



a) Explain electric discharge and lightening. (8m)



b) Explain how cyclone is formed? (4m)

OR

c) Explain Trade winds (8m)

d) Explain Classification of Clouds (4m)

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First Internal Assessment Jan-2024					
Semester: V		Subject: Physics DSC-I- Classical Mechanics and Quantum Mechanics-1		Code: 21BSC5C5PHY1L	
Date: 05/01/2024		Time: 3.00 pm to 4.00 pm		Max. Marks: 30	
Q. No. I.	Answer any Three of the following Questions				2×3=6
a)	What are Inertial and Non-inertial frames of references?				
b)	What are conservative forces?				
c)	What is Photoelectric Effect?				
d)	What is Compton Effect?				
Q. No II	Answer the following Questions				12×1=12
a)	What are Constraints? Explain different types of Constraints with example. (8 M)				
b)	Deduce the conservation theorem of Angular Momentum. (4 M)				
	OR				
c)	Obtain the Lagrange's equation for a Linear Harmonic Oscillator. Deduce the formula for its time period. (8 M)				
d)	Using Newton's laws of motion, deduce the conservation theorem of Linear Momentum. (4 M)				
Q. No. III	Answer the following Questions				12×1=12
a)	With neat diagram derive the expression for Compton Shift. (8 M)				
b)	What is group velocity and phase velocity? Give the relation between them. (4 M)				
	OR				
c)	What are matter waves? Derive the expression for Davisson-Germer experiment. (8 M)				
d)	Give the hypothesis of De-broglie matter waves. (4 M)				

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First Internal Assessment Jan-2024					
Semester: V		Subject: Physics DSC-2 Elements of Atomic, Molecular & Laser Physics		Code: 21B5C5C5PHY2L	
Date: 06/01/2024		Time: 12.00 pm to 1.00 pm		Max. Marks: 30	
Q. No. I	Answer any three of the following Questions.				2×3=6
a)	What is meant by spatial quantization?				
b)	What is meant by Electron spin hypothesis?				
c)	Write the selection rule for rotational spectrum.				
d)	What is scattering of light?				
Q. No. II	Answer the following Questions.				12×1=12
a)	Explain in detail Quantum numbers associated with vector atom model.(8M)				
b)	Explain Electron spin hypothesis.(4M)				
	OR				
c)	Explain important two features of vector atom model.(8M)				
d)	Explain magnetic orbital quantum Number m_l .(4M)				
Q.No. III	Answer the following Questions.				12×1=12
a)	Discuss the theory of rigid rotator.(8M)				
b)	The line in the pure rotational spectrum of HCL are spaced as $20.8 \times 10^{12}/m$. calculate moment of inertia and inter molecular distance when reduced mass of HCL is 1.62×10^{-27} kg.(4M)				
	OR				
c)	What is Raman effect? Explain experimental setup of Raman effect.(8M)				
d)	In Raman spectrum wavelength of incident light Is 589nm and wavelength of stoke line 600nm. Calculate the Raman shift in Hertz.(4M)				



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Second Internal Assessment Feb-2024

Semester: I

Subject: Physics DSC-I: MECHANICS & PROPERTIES OF MATTER

Code: 21BSCIC1PHY1L

Date: 10/02/2024

Time: 12.00 pm to 1.00 pm

Max. Marks: 30

Q. No. I. Answer any THREE of the following Questions. 2×3=6 M

- a) State Parallel & Perpendicular axes theorem with expression.
- b) State Kepler's 2nd & 3rd law with expression.
- c) Define Aphelion & Perihelion.
- d) State Hooke's Law.
- e) Mention the types of elastic constants.

Q. No. II. Answer the following Questions 12×1=12 M

- a) Derive an expression for M.I of a rectangular lamina about an axis through its i) centre & to one of its side ii) passing through C.G & normal to the plane. **8M**
- b) Calculate the M.I of rectangular plate of mass 1kg, about an axis through its centre of gravity & perpendicular to the plane. Its length is 0.2m & breadth 0.1m. Find its radius of gyration about the same axis. **4M**

OR

- c) Define Bending Moment? Derive an expression for Bending Moment. **8M**
- d) Calculate the bending moment of a bar of Young's modulus $20 \times 10^{10} \text{ Nm}^{-2}$, geometrical moment of inertia $4 \times 10^{-3} \text{ kgm}^3$ and bending radius 2m. **4M**

Q. No. III. Answer the following Questions 12×1=12 M

- a) State the Principle of rocket. Hence derive the expression for final velocity of single stage rocket. **8M**
- b) A satellite revolves in a circular orbit at a distance of 1620km from the surface of the earth. Calculate the orbital velocity & the time period of revolution of the satellite. **4M**
Given: $R=6380\text{km}$, $M=6 \times 10^{24}\text{kg}$, $G=6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$, $h=1620 \times 10^3\text{m}$.

OR

- c) What is Cantilever? Derive an expression for the total depression using cantilever. **8M**
- d) A metal rod of length 1m, breadth 0.03m and thickness 2.5mm is clamped at one end and loaded at other end with 2.5kg. Calculate the depression produced. **4M**
Given: Young's Modulus = $Y = 4 \times 10^{11} \text{ Nm}^{-2}$.



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Second Internal Assessment Feb-2024

Semester: III	Subject: Physics (DSC)	Code: 21B5C303PHY3
Date: 12/02/2024	Time: 4:15 pm to 5:15 pm	Max. Marks: 30
Q. No. 1.	Answer any three of the following Questions.	2×3=6
a)	What are Standing waves?	
b)	What is energy density?	
c)	Define diffraction.	
d)	Define resolving power.	
Q. No II	Answer the following Questions.	12×1=12
a)	Write the expression of normal modes of vibration along stretched string. (8m)	
b)	Derive an expression for velocity of transverse wave along stretched string. (4m)	
	OR	
c)	Write the expression for energy density and explain transmission of energy in transverse wave along stretched string. (8m)	
d)	Explain vibration in rods - longitudinal and transverse modes. (4m)	
Q. No. III	Answer the following Questions.	12×1=12
a)	Explain construction and working of zone plate. (8m)	
b)	Explain half period zone using rectilinear propagation of light. (4m)	
	OR	
c)	Explain Fraunhofer's diffraction at single slit. (8m)	
d)	Explain resolving power of prism. (4m)	



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Second Internal Assessment Feb-2024

Semester: III	Subject: Physics (OEC)	Code: 21BSC303PHY3
Date: 14/02/2024	Time: 1:30 pm to 2:30 pm	Max. Marks: 30
Q. No. 1.	Answer any three of the following Questions.	2×3=6
a)	What is climate?	
b)	Define VMR	
c)	What is green house effect?	
d)	What is global warming?	
Q. No II	Answer the following Questions.	12×1=12
a)	Explain the structure of (layers) of atmosphere. (8m)	
b)	Write the difference between weather of climate. (4m)	
	OR	
c)	Explain temperature variation in atmosphere. (8m)	
d)	Write the composition present in atmosphere. (4m)	
Q. No. III	Answer the following Questions.	12×1=12
a)	Explain modellings of the atmosphere? (8m)	
b)	Explain R and D institutions. (4m)	
	OR	
c)	Explain causes of global warming. (8m)	
d)	Explain green house effect. (4m)	



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Second Internal Assessment Feb-2024

Semester: V	Subject: DSC5- Classical Mechanics-I and Quantum Mechanics-I	Code:21BSC5C5PHY1L
Date: 09/02/2024	Time: 3.00 pm to 4.00 pm	Max. Marks: 30
Q. No. I	Answer any three of the following Questions	2×3=6
a)	What is fictitious force?	
b)	How are mass and energy related according to Einstein?	
c)	What is wave function?	
d)	Give the Normalization and orthogonality condition for the wave function.	
Q. No. II	Answer the following Questions	12×1=12
a)	Derive Lorentz Transformation equations using special theory of relativity. (8M)	
b)	If the mass of a particle in motion is 9 times its rest mass, calculate the velocity of the particle (4M)	
	OR	
c)	Derive the relation for Time Dilation. (8M)	
d)	If an electron is accelerated to a speed to 95% the speed of light, calculate the relativistic mass of an electron if its rest mass is 9.11×10^{-31} kg. (4M)	
Q.No. III	Answer the following Questions	12×1=12
a)	Derive the expression for Schrodinger's Time-Dependent wave equation for 3-D. (8M)	
b)	Explain Probability Current Density. (4M)	
	OR	
c)	Derive the expression for Schrodinger's equation for Particle in 1-D box for Infinite Potential Well. (8M)	
d)	Write the Postulates of Quantum Mechanics. (4M)	



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Second Internal Assessment Feb-2024

Semester: V

Subject: Physics DSC-6 Elements of Atomic, Molecular & Laser Physics

Code: 21B5C5C5PHY2L

Date: 13/02/2024

Time: 3.00 pm to 4.00 pm

Max. Marks: 30M

Q. No. I	Answer any three of the following Questions.	2×3=6M
a)	Define Pauli's Exclusion Principle.	
b)	Mention Selection Rules.	
c)	Write the Relations between Einstein's A and B coefficients.	
d)	What is phase space?	
Q. No. II	Answer the following Questions.	12×1=12M
a)	Explain Stern Gerlach Experiment.	(8M)
b)	Give the differences between Normal and Anomalous Zeeman Effect.	(4M)
	OR	
c)	Describe Construction and working of Zeeman Effect.(8M)	
d)	Explain spectral terms and their notations.(4M)	
Q.No. III	Answer the following Questions.	12×1=12M
a)	Explain with neat diagram construction and working of Ruby Laser.	(8M)
b)	Explain requisites of Laser.	(4M)
	OR	
c)	Derive an Expression for Maxwell-Boltzmann distribution function.	(8M)
d)	What are Ensembles? Explain its types.	(4M)



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First Internal Assessment Jan-2024

Semester: I		Subject: Physics DSC-1 MECHANICS & PROPERTIES OF MATTER	Code: 21BSC1C1PHY1L
Date: 03/01/2024		Time: 12.00 pm to 1.00 pm	Max. Marks: 30
Q. No. 1.	Answer any two of the following Questions.		2×3=6
a)	Write the dimensional formula for: i)force ii)pressure iii)strain iv)Ml		
b)	What is surface tension?		
c)	Define scalar & vector product with expression.		
d)	Define Velocity Gradient.		
Q. No II	Answer the following Questions		12×1=12
a)	Write a note on gradient of scalar function with its physical interpretation & significance.		8M
b)	Check the accuracy of following relation i) $E=mgh + \frac{1}{2}mv^2$ ii) $v^2 - u^2 = 2as^2$		4M
	OR		
c)	What is Capillarity? Derive an expression for the rise of liquid in a capillary tube.		8M
d)	Find the excess of pressure inside a spherical liquid drop of water of radius 1 mm, surface tension of water = 73×10^{-3} N/m.		4M
Q. No. III	Answer the following Questions		12×1=12
a)	Explain physical interpretation of divergence of vector field & mention its significance.		8M
b)	Convert a force of 1 newton to dyne & write the significance of dimensional equation.		4M
	OR		
c)	What is Coefficient of viscosity? Determine the coefficient of viscosity by using Poissulle's method.		8M
d)	Calculate the coefficient of viscosity of the given liquid when a steel ball of radius 5×10^{-4} m falls through it with terminal velocity 30 ms^{-1} . Given: density of steel ball = $7.8 \times 10^3 \text{ kg/m}^3$ and density of liquid = $0.87 \times 10^3 \text{ kg/m}^3$.		4M



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First Internal Assessment Jan-2024

Semester: III

Subject: Physics (DSC)

Code: 21BSC303PHY3

Date: 04/01/2024

Time: 4:15 pm to 5:15 pm

Max. Marks: 30

Q. No. 1.

Answer any three of the following Questions.

2×3=6

a)

Define Plane and Spherical waves.

b)

Define Superposition Principle.

c)

Define Interference of light.

d)

What are corpuscles?

Q. No II

Answer the following Questions.

12×1=12

a)

Derive an Expression for Intensity of progressive wave. (8m)

b)

Explain Laplace's correction for velocity of sound. (4m)

OR

c)

Explain analytical treatment for beats (with waxing and waning). (8m)

d)

Explain Superposition of two collinear oscillations having equal frequencies. (4m)

Q. No. III

Answer the following Questions.

12×1=12

a)

Derive an expression for fringe width by Young's double slit experiment. (8m)

b)

Write a note on Newton's corpuscular theory. (4m)

OR

c)

Derivation of expression for interference by a plane parallel film illuminated by a plane wave. (8m)

d)

Determine the wavelength by Michelson's interferometer. (4m)



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First Internal Assessment Jan-2024

Semester: III

Subject: Physics (OEC)

Code: 21BSC303PHY3

Date: 06/01/2024

Time: 1:30 pm to 2:30 pm

Max. Marks: 30

Q. No. 1.

Answer any three of the following Questions.

2×3=6

a) Define Cloud.

b) What is cloud seeding?

c) Define wind.

d) Define cyclone.

Q. No II

Answer the following Questions.

12×1=12

a) Explain formation of cyclone.(8m)

b) Write a note on clouds (4m)

OR

c) Explain formation of trade winds. (8m)

d) Write advantages of cloud seeding. (4m)

Q. No. III

Answer the following Questions.

12×1=12



a) Explain electric discharge and lightening. (8m)



b) Explain how cyclone is formed? (4m)

OR

c) Explain Trade winds (8m)

d) Explain Classification of Clouds (4m)

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First Internal Assessment Jan-2024					
Semester: V		Subject: Physics DSC-I- Classical Mechanics and Quantum Mechanics-1		Code: 21BSC5C5PHY1L	
Date: 05/01/2024		Time: 3.00 pm to 4.00 pm		Max. Marks: 30	
Q. No. I.	Answer any Three of the following Questions				2×3=6
a)	What are Inertial and Non-inertial frames of references?				
b)	What are conservative forces?				
c)	What is Photoelectric Effect?				
d)	What is Compton Effect?				
Q. No II	Answer the following Questions				12×1=12
a)	What are Constraints? Explain different types of Constraints with example. (8 M)				
b)	Deduce the conservation theorem of Angular Momentum. (4 M)				
	OR				
c)	Obtain the Lagrange's equation for a Linear Harmonic Oscillator. Deduce the formula for its time period. (8 M)				
d)	Using Newton's laws of motion, deduce the conservation theorem of Linear Momentum. (4 M)				
Q. No. III	Answer the following Questions				12×1=12
a)	With neat diagram derive the expression for Compton Shift. (8 M)				
b)	What is group velocity and phase velocity? Give the relation between them. (4 M)				
	OR				
c)	What are matter waves? Derive the expression for Davisson-Germer experiment. (8 M)				
d)	Give the hypothesis of De-broglie matter waves. (4 M)				

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First Internal Assessment Jan-2024					
Semester: V		Subject: Physics DSC-2 Elements of Atomic, Molecular & Laser Physics		Code: 21B5C5C5PHY2L	
Date: 06/01/2024		Time: 12.00 pm to 1.00 pm		Max. Marks: 30	
Q. No. I	Answer any three of the following Questions.				2×3=6
a)	What is meant by spatial quantization?				
b)	What is meant by Electron spin hypothesis?				
c)	Write the selection rule for rotational spectrum.				
d)	What is scattering of light?				
Q. No. II	Answer the following Questions.				12×1=12
a)	Explain in detail Quantum numbers associated with vector atom model.(8M)				
b)	Explain Electron spin hypothesis.(4M)				
	OR				
c)	Explain important two features of vector atom model.(8M)				
d)	Explain magnetic orbital quantum Number m_l .(4M)				
Q.No. III	Answer the following Questions.				12×1=12
a)	Discuss the theory of rigid rotator.(8M)				
b)	The line in the pure rotational spectrum of HCL are spaced as $20.8 \times 10^{12}/m$. calculate moment of inertia and inter molecular distance when reduced mass of HCL is 1.62×10^{-27} kg.(4M)				
	OR				
c)	What is Raman effect? Explain experimental setup of Raman effect.(8M)				
d)	In Raman spectrum wavelength of incident light Is 589nm and wavelength of stoke line 600nm. Calculate the Raman shift in Hertz.(4M)				



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Second Internal Assessment Feb-2024

Semester: I

Subject: Physics DSC-I: MECHANICS & PROPERTIES OF MATTER

Code: 21BSCIC1PHY1L

Date: 10/02/2024

Time: 12.00 pm to 1.00 pm

Max. Marks: 30

Q. No. I. Answer any THREE of the following Questions. 2×3=6 M

- a) State Parallel & Perpendicular axes theorem with expression.
- b) State Kepler's 2nd & 3rd law with expression.
- c) Define Aphelion & Perihelion.
- d) State Hooke's Law.
- e) Mention the types of elastic constants.

Q. No. II. Answer the following Questions 12×1=12 M

- a) Derive an expression for M.I of a rectangular lamina about an axis through its i) centre & to one of its side ii) passing through C.G & normal to the plane. **8M**
- b) Calculate the M.I of rectangular plate of mass 1kg, about an axis through its centre of gravity & perpendicular to the plane. Its length is 0.2m & breadth 0.1m. Find its radius of gyration about the same axis. **4M**

OR

- c) Define Bending Moment? Derive an expression for Bending Moment. **8M**
- d) Calculate the bending moment of a bar of Young's modulus $20 \times 10^{10} \text{ Nm}^{-2}$, geometrical moment of inertia $4 \times 10^{-3} \text{ kgm}^3$ and bending radius 2m. **4M**

Q. No. III. Answer the following Questions 12×1=12 M

- a) State the Principle of rocket. Hence derive the expression for final velocity of single stage rocket. **8M**
- b) A satellite revolves in a circular orbit at a distance of 1620km from the surface of the earth. Calculate the orbital velocity & the time period of revolution of the satellite. **4M**
Given: $R=6380\text{km}$, $M=6 \times 10^{24}\text{kg}$, $G=6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$, $h=1620 \times 10^3\text{m}$.

OR

- c) What is Cantilever? Derive an expression for the total depression using cantilever. **8M**
- d) A metal rod of length 1m, breadth 0.03m and thickness 2.5mm is clamped at one end and loaded at other end with 2.5kg. Calculate the depression produced. **4M**
Given: Young's Modulus = $Y = 4 \times 10^{11} \text{ Nm}^{-2}$.



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Second Internal Assessment Feb-2024

Semester: III	Subject: Physics (DSC)	Code: 21B5C303PHY3
Date: 12/02/2024	Time: 4:15 pm to 5:15 pm	Max. Marks: 30
Q. No. 1.	Answer any three of the following Questions.	2×3=6
a)	What are Standing waves?	
b)	What is energy density?	
c)	Define diffraction.	
d)	Define resolving power.	
Q. No II	Answer the following Questions.	12×1=12
a)	Write the expression of normal modes of vibration along stretched string. (8m)	
b)	Derive an expression for velocity of transverse wave along stretched string. (4m)	
	OR	
c)	Write the expression for energy density and explain transmission of energy in transverse wave along stretched string. (8m)	
d)	Explain vibration in rods - longitudinal and transverse modes. (4m)	
Q. No. III	Answer the following Questions.	12×1=12
a)	Explain construction and working of zone plate. (8m)	
b)	Explain half period zone using rectilinear propagation of light. (4m)	
	OR	
c)	Explain Fraunhofer's diffraction at single slit. (8m)	
d)	Explain resolving power of prism. (4m)	



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Second Internal Assessment Feb-2024

Semester: III	Subject: Physics (OEC)	Code: 21BSC303PHY3
Date: 14/02/2024	Time: 1:30 pm to 2:30 pm	Max. Marks: 30
Q. No. 1.	Answer any three of the following Questions.	2×3=6
a)	What is climate?	
b)	Define VMR	
c)	What is green house effect?	
d)	What is global warming?	
Q. No II	Answer the following Questions.	12×1=12
a)	Explain the structure of (layers) of atmosphere. (8m)	
b)	Write the difference between weather of climate. (4m)	
	OR	
c)	Explain temperature variation in atmosphere. (8m)	
d)	Write the composition present in atmosphere. (4m)	
Q. No. III	Answer the following Questions.	12×1=12
a)	Explain modellings of the atmosphere? (8m)	
b)	Explain R and D institutions. (4m)	
	OR	
c)	Explain causes of global warming. (8m)	
d)	Explain green house effect. (4m)	



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Second Internal Assessment Feb-2024

Semester: V	Subject: DSC5- Classical Mechanics-I and Quantum Mechanics-I	Code:21BSC5C5PHY1L
Date: 09/02/2024	Time: 3.00 pm to 4.00 pm	Max. Marks: 30
Q. No. I	Answer any three of the following Questions	2×3=6
a)	What is fictitious force?	
b)	How are mass and energy related according to Einstein?	
c)	What is wave function?	
d)	Give the Normalization and orthogonality condition for the wave function.	
Q. No. II	Answer the following Questions	12×1=12
a)	Derive Lorentz Transformation equations using special theory of relativity. (8M)	
b)	If the mass of a particle in motion is 9 times its rest mass, calculate the velocity of the particle (4M)	
	OR	
c)	Derive the relation for Time Dilation. (8M)	
d)	If an electron is accelerated to a speed to 95% the speed of light, calculate the relativistic mass of an electron if its rest mass is 9.11×10^{-31} kg. (4M)	
Q.No. III	Answer the following Questions	12×1=12
a)	Derive the expression for Schrodinger's Time-Dependent wave equation for 3-D. (8M)	
b)	Explain Probability Current Density. (4M)	
	OR	
c)	Derive the expression for Schrodinger's equation for Particle in 1-D box for Infinite Potential Well. (8M)	
d)	Write the Postulates of Quantum Mechanics. (4M)	



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Second Internal Assessment Feb-2024

Semester: V

Subject: Physics DSC-6 Elements of Atomic, Molecular & Laser Physics



Code: 21B5C5C5PHY2L

Date: 13/02/2024

Time: 3.00 pm to 4.00 pm

Max. Marks: 30M

Q. No. I	Answer any three of the following Questions.	2×3=6M
a)	Define Pauli's Exclusion Principle.	
b)	Mention Selection Rules.	
c)	Write the Relations between Einstein's A and B coefficients.	
d)	What is phase space?	
Q. No. II	Answer the following Questions.	12×1=12M
a)	Explain Stern Gerlach Experiment.	(8M)
b)	Give the differences between Normal and Anomalous Zeeman Effect.	(4M)
	OR	
c)	Describe Construction and working of Zeeman Effect.(8M)	
d)	Explain spectral terms and their notations.(4M)	
Q.No. III	Answer the following Questions.	12×1=12M
a)	Explain with neat diagram construction and working of Ruby Laser.	(8M)
b)	Explain requisites of Laser.	(4M)
	OR	
c)	Derive an Expression for Maxwell-Boltzmann distribution function.	(8M)
d)	What are Ensembles? Explain its types.	(4M)

	<p style="text-align: center;">B. L. D. E. Association's S. B. ARTS AND K. C. P. SCIENCE COLLEGE, VIJAYAPUR DEPARTMENT OF PHYSICS</p>			
	<p style="text-align: center;">First Internal Assessment Test - July-2024</p>			
<p>Semester: II</p>	<p>Subject: Physics (Electricity & Magnetism)</p>	<p>Code: 21BSC2C2PHY1L</p>		
<p>Date: 09/07/2024</p>	<p>Time: 9.30 am to 10.20 am</p>	<p>Max. Marks: 30</p>		
<p>Q. No. I</p>	<p>Answer any three of the following Questions.</p>			<p>2×3=6M</p>
<p>a)</p>	<p>State Coulomb's law with its expression.</p>			
<p>b)</p>	<p>What are Dielectric materials? Write its types.</p>			
<p>c)</p>	<p>Write the relation between three magnetic vectors B, H and M.</p>			
<p>d)</p>	<p>What is Magnetization?</p>			
<p>Q. No. II</p>	<p>Answer the following Questions.</p>			<p>12×1=12M</p>
<p>a)</p>	<p>State Gauss Law. Obtain an expression for electric field due to charge distribution with i) spherical ii) cylindrical symmetry.</p>			<p>(8M)</p>
<p>b)</p>	<p>Find the potential at the center of a 1m square having charges q, -2q, 3q & 2q at its corners. (q=1×10⁻⁸ C)</p>			<p>(4M)</p>
	<p style="text-align: center;">OR</p>			
<p>c)</p>	<p>Explain the importance of B-H curve of the magnetic materials with neat diagram.</p>			<p>(8M)</p>
<p>d)</p>	<p>Mention the types of magnetic materials and give an example for each.</p>			<p>(4M)</p>
<p>Q.No. III</p>	<p>Answer the following Questions.</p>			<p>12×1=12M</p>
<p>a)</p>	<p>Derive an expression for capacitance of i) Parallel plate capacitor ii) Cylindrical capacitor iii) Spherical capacitor filled with dielectric material.</p>			<p>(8M)</p>
<p>b)</p>	<p>A Cable has a wire of radius 1mm & it is surrounded by a thin metallic sheet of radius 6mm. the space between the cable & the sheet is filled with a material of dielectric constant 2.05. What is the capacitance of 8km length cable?</p>			<p>(4M)</p>
	<p style="text-align: center;">OR</p>			
<p>c)</p>	<p>Derive an expression for the energy stored in a magnetic field.</p>			<p>(8M)</p>
<p>d)</p>	<p>Write differential forms of Maxwell's equations.</p>			<p>(4M)</p>



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First Internal Assessment July-2024

Semester: IV

Subject: Thermal Physics and Electronics.

Code: 21BSC4C2PHY4L

Date: 09/07/2024

Time: 9.30 am to 10.20 am

Max. Marks: 30

Q. No. I.	Answer any Three of the following Questions	2×3=6
a)	Define system and surrounding in Thermodynamics.	
b)	Define refrigeration and co-efficient of performance.	
c)	Define forbidden energy gap.	
d)	Define potential barrier.	
Q. No II	Answer the following Questions	12×1=12
a)	Write a note on T-S diagram.	(8 M)
b)	Calculate the change in entropy when 5 Kg of water at 100 °C is converted into steam at same temperature? (Given: Latent heat of steam = 540 Cal/gram). (4 M)	
	OR	
c)	Derive an expression for work done during the isothermal process and adiabatic process.	(8 M)
d)	State Kelvin-Planck statement and Clausius statement for second law of thermodynamics.	(4 M)
Q. No. III	Answer the following Questions	12×1=12
a)	Explain forward and reverse biased characteristics of P-N junction diode. (8 M)	
b)	Explain intrinsic semiconductor. (4 M)	
	OR	
c)	Explain full wave center taped rectifier with circuit diagram. (8 M)	
d)	Write the comparison between center tapped rectifier and bridge rectifier. (4 M)	



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First Internal Assessment July-2024

Semester: VI

**Subject: DSC9-Elements of Condensed
Matter & Nuclear Physics**

Code:21BSC6C6PHY1L

Date: 10/07/2024

Time: 1.40 pm to 2.30 pm

Max. Marks: 30

Q. No. I

Answer any three of the following Questions

2×3=6

a)

What is Weidman-Franz law?

b)

What is Fermi Energy?

c)

What are the two important Hypotheses about the actual constituents of the nucleus?

d)

Mention two constituent particles of the nucleus.

Q. No. II

Answer the following Questions

12×1=12

a)

Derive an expression for electrical conductivity of a metal based on Classical Free Electron Theory (CFET). (8 Marks)

b)

Mention any four failures of Classical Free Electron Theory (CFET). (4 Marks)

OR

c)

Discuss the dependence of Fermi Factor $f(E)$ (i.e., Fermi –Dirac Distribution Function) on temperature ($T = 0\text{ K}$ and $T > 0\text{ K}$) and energy ($E > E_F$ and $E < E_F$). (8 Marks)

d)

The electrical and thermal conductivity of Silver at 293 K are 6.22×10^7 SI unit and 423 SI unit, respectively. Calculate the Lorentz number. (4 Marks)

Q.No. III

Answer the following Questions

12×1=12

a)

Describe theory of Proton - Neutron Hypothesis. (8 Marks)

b)

Explain in brief about Nuclear Size/Radius. (4 Marks)

OR

c)

Explain Main features of Binding Energy versus Mass Number curve. (8 Marks)

d)

Write a note on Nuclear Density. (4 Marks)



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First Internal Assessment July-2024

Semester: VI

**Subject: Electronic instrumentation and
Sensors**

Code: 21BSC6C6PHY2L

Date: 13/07/2024

Time: 1.40 pm to 2.30 pm

Max. Marks: 30

Q. No. I. Answer any Three of the following Questions

2×3=6

- a) What is single phase and three phase power supply?
- b) Define ripple factor and peak inverse voltage of rectifier.
- c) What is periodic function?
- d) State Dirchlet's conditions.

Q. No II Answer the following Questions

12×1=12

- a) What are characteristics of AC power supply? **(8 M)**
- b) Write the difference between AC and DC power supply. **(4 M)**
- OR**
- c) Discuss the construction and working of Bridge rectifier. **(8 M)**
- d) What is L- type filter and π - type filter. **(4 M)**

Q. No. III Answer the following Questions

12×1=12

- a) Expand periodic function in a series of sine and cosine functions and hence determine its coefficients. **(8 M)**
- b) Find the half – range sine series of $f(x)=1$ in $[0,1]$. **(4 M)**

OR

- c) State and prove properties of Laplace transform. **(8 M)**
- d) Find the Laplace transform of $f(t)=t^2$ using the transform of derivative. **(4 M)**



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Second Internal Assessment August-2024

Semester: II

Subject: Physics DSC Electricity & Magnetism

Code: 21B5C5C5PHY2L

Date: 06/08/2024

Time: 09.30 am to 10.30 am

Max. Marks: 30

Q. No. I

Answer any three of the following Questions.

2×3=6

a) State ampere's circuital law with expression.

b) Write the properties of magnetic field lines.

c) State Kirchhoff's law.

d) What is Ballistic Galvanometer?

Q. No. II

Answer the following Questions.

12×1=12

a) State Biot sarvart's law. Derive the expression for magnetic field i)at a point due to long straight conductor carrying current ii)at a point along the axis of a circular coil carrying current. 8M

b) Calculate the M.F due to a circular coil of 500 turns & radius 0.05m carrying a current of 7amp i)at a point on the axis of a coil at distant of 0.12m ii)at the center of the coil. 4M

OR

c) Explain the Measurement of High resistance by Leakage method. 8M

d) Derive the expression for growth of current in RL circuit. 4M

Q.No. III

Answer the following Questions.

12×1=12



a) Explain the Principle, Construction and working of Helmholtz Galvanometer. 8M

b) A HG having coils each of 50 turns & radius 0.1m produces a deflection of 45° . When a current of 0.1A flows through it. Calculate the horizontal component of the earth's field & reduction factor of the galvanometer. 4M

OR

c) Derive the expression for current and time period of Ballistic Galvanometer. 8M

d) Explain the Principle and Construction of Ballistic Galvanometer. 4M

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Second Internal Assessment August-2024					
Semester: IV		Subject: Thermal Physics and Electronics.		Code: 21BSC4C2PHY4L	
Date: 06/08/2024		Time: 9.30 am to 10.20 am		Max. Marks: 30	
Q. No. I.	Answer any Three of the following Questions				2×3=6
a)	State second law of thermodynamics in terms of entropy.				
b)	Define efficiency and write the expression of efficiency of heat engine.				
c)	What are feedbacks? Write the types of feedback.				
d)	Define drain resistance and write its expression.				
Q. No II	Answer the following Questions				12×1=12
a)	Write a note on Carnot heat engine. (8 M)				
b)	Find the efficiency of Carnot's engine working between the steam point and ice point. (4 M)				
OR					
c)	Discuss diesel engine and derive the expression for efficiency of diesel engine. (8 M)				
d)	A Carnot's engine whose temperature of the source is 400 K takes 200 calories of heat at this temperature and rejects 150 calories of heat to the sink. What is the temperature of sink? Also calculate the efficiency of engine. (4 M)				
Q. No. III	Answer the following Questions				12×1=12
a)	Explain the output characteristics of CB configuration. (8 M)				
b)	Write the comparison between amplifier and oscillator. (4 M)				
OR					
c)	Explain the principle and working of phase shift oscillator (8 M)				
d)	Explain LC filter. (4 M)				



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Second Internal Assessment August -2024

Semester: VI

**Subject: Electronic instrumentation and
Sensors**

Code: 21BSC6C6PHY2L

Date: 09/08/2024

Time: 1.40 pm to 2.30 pm

Max. Marks: 30

Q. No. I. Answer any Three of the following Questions

2×3=6

a) Define electronic voltage regulator.

b) What are DC ammeter and DC voltmeter?

c) What is Thermistor?

d) What is Piezo-resistive effect?

Q. No II Answer the following Questions

12×1=12

a) Write a note on Cathode Ray Oscilloscope.

(8 M)

b) Write a note on features of Cathode Ray Tube(CRT).

(4 M)

OR

c) Explain AC voltmeter using rectifier.

(8 M)

d) Write the requirements of the shunt resistance.

(4 M)

Q. No. III Answer the following Questions

12×1=12

a) What is transducer? Explain its types.

(8 M)

b) Write the factors governing the selection of transducer.

(4 M)

OR

c) Explain with neat labeled diagram construction and working of Platinum Resistance Thermometer.

(8 M)

d) Write a note on Potentiometer.

(4 M)



B. L. D. E. Association's
S. B. ARTS AND K. C. P. SCIENCE COLLEGE, VIJAYAPUR
DEPARTMENT OF PHYSICS



Second Internal Assessment August -2024

Semester: VI

Subject: DSC9-Elements of Condensed Matter & Nuclear Physics

Code:21BSC6C6PHY1L

Date: 06/08/2024

Time: 1.40 pm to 2.30 pm

Max. Marks: 30

Q. No. I

Answer any three of the following Questions

2×3=6

a)

What is Dielectric Constant?

b)

Mention different types of polarization in dielectrics?

c)

Define Photo electric effect.

d)

Define Compton scattering.

Q. No. II

Answer the following Questions

12×1=12

a)

Deduce Clausius - Mossotti equation.

(8 Marks)

b)

An elemental solid dielectric material has polarizability $7 \times 10^{-40} \text{ Fm}^{-2}$. Calculate dielectric constant for the material having $3 \times 10^{28} \text{ atoms/m}^3$ and the internal field to be Lorentz field.

(4 Marks)

OR

c)

What is Internal Field? Obtain an expression for the internal field inside the dielectric.

(8 Marks)

d)

If a NaCl crystal is subjected to an electric field of 1000 V/m and the resulting polarization is $4.3 \times 10^{-8} \text{ C/m}^2$, calculate the dielectric constant of NaCl.

(4 Marks)

Q.No. III

Answer the following Questions

12×1=12

a)

Explain Semi-Empirical mass formula.

(8 Marks)

b)

Mention different properties of liquid drop model.

(4 Marks)

OR

c)

Explain nuclear fission on the basis of liquid drop model.

(8 Marks)

d)

Describe Pair production process.

(4 Marks)