

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch – PHYSICS

ASTROPHYSICS & PHILOSOPHY OF PHYSICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Question No.	Question	K Level	CO
1	C.V Raman was the first Asian and non-white person to receive a Nobel prize in which field ? a) Chemistry b) Physics c) medicine d) peace	K4	CO3
2	Kepler was the assistant to which famous Astronomer ? a) Galileo Galilei b) Isaac newton c) Tycho Brahe d) Nicolaus Copernicus	K5	CO4
3	Which of the following materials is most commonly used for studying the Photoelectric effect ? a) Aluminium b) copper c) sodium d) Iron	K4	CO3
4	Which of the following is a traditional light – sensitive material used in Photography ? a) Gold b) Silver Halide c) copper d) Iron	K4	CO3
5	What colour are the hottest stars? a) Red b) yellow c) blue d) white	K2	CO1
6	What type of galaxy is the milky way ? a) Elliptical b) spiral c) irregular d) lenticular	K4	CO3
7	What determines the lifespan of a star ? a) size b) colour c) mass d) distance from earth	K2	CO1
8	What is the observable universe's estimated age..... billion years ? a) 4.6 b) 10 c) 13.8 d) 100	K5	CO4
9	What is the approximate value of the Chandrasekhar limit Solar Masses ? a) 1 b) 1.4 c) 2.0 d) 3.0	K3	CO2
10	What colour is a typical M type Star ? a) Blue b) yellow c) red d) white	K4	CO3

Cont...

SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Assess Stephen hawking's influence on popular science.	K4	CO3
(OR)			
11.b.	Analyze the Historical development and philosophical implications of the Biot savart Law.		
12.a.	Explain photoelectric method.	K4	CO2
(OR)			
12.b.	Write short note on azimuthal system.		
13.a.	Analyze the impact of space missions on our understanding of solar system distance	K2	CO1
(OR)			
13.b.	Explain spectroscopic parallax method.		
14.a.	Explain Radio telescope.	K2	CO1
(OR)			
14.b.	Write the physical properties of stars.		
15.a.	Derive the equations of stellar structure.	K3	CO2
(OR)			
15.b.	Explain Chandrasekhar limit.		

SECTION -C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks

(3 × 10 = 30)

Question No.	Question	K Level	CO
16	Explain work of Nicolas Copernicus.	K6	CO5
17	Describe about the photographic method .	K3	CO2
18	Write short note on (i) cluster parallax (ii) secular parallax	K3	CO2
19	Explain milky way galaxy.	K4	CO3
20	Explain Eddington's standard model.	K2	CO1

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)
Branch – **PHYSICS**

PROPERTIES OF MATTER AND SOUND

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Choose the maximum elasticity is in a)Rubber b)Glass c)Silver d)Steel	K1	CO1
	2	Show the unit of Young's modulus a)N/m b)N-m c)N/m ² d)N/Kgm	K2	CO1
2	3	Which property measures the resistance of a liquid flow? a)density b)viscosity c)solubility d)volume	K1	CO2
	4	Interpret the viscosity of liquids decreases rapidly with an ----- in temperature a)decrease b)increase c)equal d)no change	K2	CO2
3	5	Osmosis is a special kind of ----- a)regulation b)absorption c)diffusion d)none of the above	K1	CO3
	6	Relate the method to determine surface tension of a liquid? a)Bernoulli's method b)Jaeger's method c)Poiseuille's method d)viscometer	K2	CO3
4	7	Which is not the property of longitudinal wave? a)amplitude b)vibration c)compression d)density	K1	CO4
	8	The change in frequency of a wave with respect to an observer who is moving relative to the wave source a)SHM b)Doppler effect c)compression d)rarefaction	K2	CO4
5	9	Which one of the following materials is piezo-electric material? a)Copper b)Tourmaline c)sodium chloride d)Aluminium	K1	CO5
	10	Concave surfaces in a hall should be covered with sound absorbing materials to avoid a) Reverberation b)Echelon effect c) Resonance d)Focussing	K2	CO5

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Demonstrate the theory of torsion pendulum to determine rigidity modulus.	K2	CO1
	(OR)			
	11.b.	Outline the theory of Koenig's to find Young modulus.		

Cont...

2	12.a.	Apply Stoke's method for determining the viscosity of a viscous liquid.	K3	CO2
	(OR)			
	12.b.	Develop the theory of variation of viscosity with temperature.		
3	13.a.	Experiment with Interfacial surface tension between water and kerosene.	K3	CO3
	(OR)			
	13.b.	Apply the theory of Quincke's method to find surface tension.		
4	14.a.	Compare longitudinal and transverse waves.	K4	CO4
	(OR)			
	14.b.	Survey the effect of wind velocity.		
5	15.a.	Inspect the piezo electric generator to produce ultrasonic waves.	K4	CO5
	(OR)			
	15.b.	Dissect the factors affecting acoustic of buildings.		

SECTION -C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Define rigidity modulus and derive an expression for couple per unit twist.	K5	CO1
2	17	Derive Poiseulle's formula for the flow of liquid through a capillary tube with its correction.	K4	CO2
3	18	Explain in detail Jaeger's method for measuring surface tension of a liquid.	K4	CO3
4	19	Derive an expression for the equation of motion of simple harmonic oscillator and find its solution.	K5	CO4
5	20	What are ultrasonic waves? How are they produced using a magnetostriction oscillator?	K4	CO5

Z-Z-Z

END

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)**

Branch- **PHYSICS**

MATHEMATICS – I FOR PHYSICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Curvature of a curve $y = f(x)$ is defined as (a) $\frac{dy}{dx}$ (b) $\frac{dy}{ds}$ (c) $\frac{d\chi}{ds}$ (d) $\frac{ds}{d\chi}$	K1	CO1
	2	The radius of curvature of a curve $y = f(x)$ is defined as _____ (a) $\frac{dx}{dy}$ (b) $\frac{ds}{dy}$ (c) $\frac{ds}{d\chi}$ (d) $\frac{d\chi}{ds}$	K2	CO1
2	3	$\int u dv =$ _____ (a) $uv - \int vdu$ (b) $uv + \int v du$ (c) $uv - vdu$ (d) None	K1	CO2
	4	$\int_a^b f(x) dx =$ _____, where $f(x)$ is an odd function. (a) $\int_a^b f(x) dx$ (b) $-\int_b^a f(x) dx$ (c) $\int_c^b f(x) dx$ (d) None	K2	CO2
3	5	The value of $\int_0^1 \int_0^2 (x+2) dy dx$ is (a) 5 (b) 15 (c) 10 (d) 20	K1	CO3
	6	The value of $\int_0^1 \int_0^1 \int_0^1 dx dy dz$ is (a) 1 (b) 3 (c) 0 (d) 2	K2	CO3
4	7	$\nabla \times \vec{r} =$ _____. (a) $\vec{r}$ (b) 3 (c) 0 (d) $2\vec{r}$	K1	CO4
	8	If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$, then $\text{div}(\vec{r}) =$ _____ (a) 0 (b) 3 (c) 5 (d) 2	K2	CO4
5	9	$\int_C \vec{F} \cdot d\vec{r} = \iint_S (\nabla \times \vec{F}) \cdot \hat{n} ds$. Find whether the given statement is (a) Green's theorem (b) Stoke's theorem (c) Surface theorem (d) Gauss divergence theorem.	K1	CO5
	10	$\iiint_V \vec{F} \cdot d\vec{s} = \iiint_V \nabla \cdot \vec{F} dv$. Find whether the given statement is (a) Green's theorem (b) Stoke's theorem (c) Surface theorem (d) Gauss divergence theorem.	K2	CO5

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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Obtain the radius of curvature at the point $\left(\frac{a}{4}, \frac{a}{4}\right)$ to the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$.	K2	CO1
		(OR)		
	11.b.	Show that the radius of curvature at the point 'θ' on the curve $x = a(\cos\theta + \theta\sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$.		
2	12.a.	Find $\int e^{ax} x^3 dx$, using Bernoulli's formula.	K2	CO2
		(OR)		
	12.b.	Evaluate $\int x e^x dx$, by integration by parts.		
3	13.a.	Find $\int_0^1 \int_0^2 (x^2 + y^2) dy dx$.	K3	CO3
		(OR)		
	13.b.	Find $\int_2^4 \int_0^x \int_0^{\sqrt{x+y}} z dz dy dx$.		
4	14.a.	Find grad ϕ if $\phi = xyz$ at (1, 1, 1).	K3	CO4
		(OR)		
	14.b.	Find the directional derivative of $\phi = xy + yz + zx$ in the direction of the vector $\vec{i} + 2\vec{j} + 2\vec{k}$ at (1, 2, 0).		
5	15.a.	If $\vec{F} = x^2\vec{i} + xy\vec{j}$, evaluate $\int \vec{F} \cdot d\vec{r}$ from (0, 0) to (1, 1) along the line $y = x$.	K3	CO5
		(OR)		
	15.b.	Evaluate $\int_C \vec{F} \cdot d\vec{r}$, by stoke's theorem where $\vec{F} = (x^2 - y^2)\vec{i} + xy\vec{j}$ in the rectangular region in the xoy plane bounded by the lines $x = 0$, $x = a$, $y = 0$ and $y = b$.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Prove that the radius of curvature at the point $x = 3a \cos\theta - a \cos 3\theta$, $y = 3a \sin\theta - a \sin 3\theta$ is $3a \sin\theta$	K2	CO1
2	17	Evaluate $\int_0^{\pi/4} \log(1 + \tan\phi) d\phi$.	K2	CO2
3	18	Find the area bounded by a quadrant of the ellipse $4x^2 + 9y^2 = 36$.	K3	CO3
4	19	If $\vec{F} = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$, then find $\nabla \cdot \vec{F}$ and $\nabla \times \vec{F}$	K3	CO4
5	20	Verify the Gauss divergence theorem for $\vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ over the cube bounded by $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$, $z = 1$	K3	CO5

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2024
(Second Semester)
Branch – **PHYSICS**

THERMAL AND STATISTICAL PHYSICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What is the range of a gas thermometer? a) -150 to 600°C b) -15 to 600°C c) -50 to 600°C d) -0 to 600°C	K1	CO1
	2	Which of the following is a type of temperature measurement device that uses the expansion of a liquid to measure temperature? a) Thermocouple b) Thermistor c) Mercury thermometer d) Both a & b	K2	CO1
2	3	Joule-Thomson effect explains the change in temperature that accompanies expansion of a gas a) without production of work or transfer of heat. b) with production of work or transfer of heat. c) without production of work or with transfer of heat. d) with production of work or without transfer of heat.	K1	CO2
	4	In van der Waal's equation, b is known as a) volume constant b) pressure constant c) volume correction d) pressure correction	K2	CO2
3	5	Rayleigh-Jeans law of Radiation a) applies to smaller wavelengths b) applies to longer wavelengths c) applies to all wavelengths d) does not apply to any wavelength	K1	CO3
	6	Wien's displacement law is expressed by the equation a) $\lambda_m T = \text{Constant}$ b) $\lambda_m \sqrt{T} = \text{Constant}$ c) $\lambda_m T^2 = \text{Constant}$ d) $\lambda_m T^3 = \text{Constant}$	K2	CO3
4	7	Out of the following, the physical quantity, that relates with the first law of thermodynamics is a) Temperature b) Pressure c) Energy d) Volume	K1	CO4
	8	In Carnot cycle, the first step is a) Isothermal expansion b) Isothermal compression c) Adiabatic expansion d) Adiabatic compression	K2	CO4

Cont...

5	9	Which of the following particles is a kind of Bose particle? a) Electrons b) Protons c) Photons d) Neutrons	K1	CO5
	10	The most probable distribution of particles obeying Maxwell – Boltzmann statistics is given by a) $n_i = g_i / (e^{\alpha + \beta \epsilon_i} + 1)$ b) $n_i = g_i / (e^{\alpha + \beta \epsilon_i} - 1)$ c) $n_i = g_i / e^{\alpha + \beta \epsilon_i}$ d) $n_i = g_i / e^{\alpha - \beta \epsilon_i}$	K2	CO5

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Discus the working of the clinical thermometer.	K5	CO3
	(OR)			
	11.b.	Describe the construction and working of thermoelectric thermometer.		
2	12.a	Explain the theory of Porus plug experiment.	K3	CO3
	(OR)			
	12.b.	Outline the properties of liquid helium I and II.		
3	13.a.	Deduce Newton's law of cooling from Stefan's law.	K3	CO3
	(OR)			
	13.b.	Deduce Wien's displacement law for the distribution of energy in black body spectrum.		
4	14.a.	A Carnot engine efficiency 40% and temperature of sink 300 K to increase up to 60% calculate the change in temperature of the source.	K4	CO4
	(OR)			
	14.b.	Calculate the efficiency of a Carnot engine operating between temperatures of 900 K and 300 K.		
5	15.a.	Derive the expression for Fermi – Dirac distribution.	K4	CO4
	(OR)			
	15.b.	Compare M-B, B- E and F- D statistics.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Describe the construction and working of platinum resistance thermometer.	K4	CO4
2	17	Derive Van der Waal's equation.	K4	CO4
3	18	Describe Lee's method for determination of the thermal conductivity of bad conductor	K4	CO4
4	19	Obtain Maxwell thermodynamic relations.	K5	CO3
5	20	Obtain the expression for Maxwell Boltzmann distribution law.	K5	CO3

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION DECEMBER 2024
(Second Semester)**

Branch - **PHYSICS**

MECHANICS AND FLUID DYNAMICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	A conservative force F is ----- (Where U is the potential energy) a. grad U b. -grad U c. U d. grad U ²	K1	CO1
	2	The total linear momentum of the system of the particles about the centre of mass is ---- a. zero b. infinity b. not equal to zero d. none of them	K2	CO2
2	3	If l is the length of the compound pendulum, then the length of an equivalent simple pendulum L is --- a. k^2+l^2 b. $(k^2+l^2)/2$ c. $(k^2+l^2)/l$ d. $(k+l)/l$	K1	CO1
	4	The kinetic energy of rotation of the body about its axis through its centre of mass is --- a. $I\omega$ b. $I\omega^2$ c. $I\omega/2$ d. $I\omega^2/2$	K2	CO2
3	5	Statement I: A body may not have a Centre of Gravity Statement II: A body must have a Centre of Mass a. Both statements I and II correct b. Statement I alone is correct c. Statement II alone is correct d. Statements I and II not correct	K1	CO1
	6	A solid hemisphere of radius is r, then the CG of the solid hemisphere is on its axis at a distance of ----- from the centre. a. $(3/8)r$ b. $(1/2)r$ c. $(8/3)r$ d. $(1/8)r$	K2	CO2
4	7	Thrust = ----- a. Pressure b. Pressure/area c. Pressure*area d. Pressure*length	K1	CO1
	8	A ship is of 20000 tons , a load of 30 tons moved 50 m across the deck makes the ship tilt through $(3/4)^\circ$. Its metacentric height is --- a. 0.579 m b. 5.79 m c. 57.9 m d. 1 m	K2	CO2
5	9	A liquid is in motion, they possesses--- a. Potential energy b. Kinetic energy c. Pressure energy d. Potential, kinetic and pressure energy	K1	CO1

Cont...

	10	When a liquid flowing through a horizontal pipe, Bernoulli's theorem state that ---- a. Static pressure is constant b. Dynamic pressure is constant c. Static+dynamic pressure is constant d. Static+ dynamic pressure is not constant	K2	CO2
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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Show that $\vec{F} = (y^2 - x^2)\hat{i} + 2xy\hat{j}$ is a conservative force and also calculate the work done on a particle moving from the position (0,1,2) to (5,6,8)	K3	CO4
		(OR)		
	11.b.	State the principle of conservation of (i) linear momentum and (ii) angular momentum		
2	12.a.	Define centres of suspension and oscillation of a compound pendulum and show that they are interchangeable.	K3	CO4
		(OR)		
	12.b.	Calculate the moment of inertia of a solid cylinder about its axis of cylindrical symmetry.		
3	13.a.	State (i) parallelogram law of forces and (ii) triangular law of forces.	K2	CO3
		(OR)		
	13.b.	Explain (i) angle of friction and (ii) cone of friction.		
4	14.a.	State the laws of floatation. Write a note on stability of floating bodies.	K4	CO3
		(OR)		
	14.b.	Determine the centre of pressure of rectangular lamina immersed vertically in a liquid with one edge in the surface of the liquid.		
5	15.a.	Obtain the equation of continuity for an incompressible liquid.	K4	CO2
		(OR)		
	15.b.	State and Prove Bernoulli's theorem.		

SECTION - C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	What is a rocket? Describe the theory and principle of a rocket.	K4	CO2
2	17	Obtain an expression for time period of the compound pendulum and hence find the acceleration due to gravity.	K5	CO3
3	18	Determine the CG of a thin hollow and solid hemisphere.	K5	CO4
4	19	Define metacenter and metacentric height. Determine the metacentric height of a ship.	K4	CO2
5	20	Apply Lagrange's equation to the Atwood's machine to find the acceleration of the system.	K6	CO5

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2024
(Third Semester)

Branch – **PHYSICS**

ELECTRICITY AND MAGNETISM

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Choose the appropriate one. If all the points of a surface are the same electric potential, then the surface is called an _____. (a) Electric Potential (b) Equipotential Surface (c) Potential surface (d) Electrical force	K1	CO5
	2	Relate the electric dipole moment developed per unit volume. (a) Electric Potential (b) Polarization (c) charge density (d) susceptibility	K2	CO2
2	3	Select the unit of current density. (a) A/m ² (b) A/m (c) m ² /A (d) A	K1	CO5
	4	Show the network for Thevenin's theorem (a) Linear (b) both linear and Non linear (c) non Linear (d) neither Linear nor Non linear.	K2	CO3
3	5	Which instrument can be used to compare two E.M.Fs? (a) Galvanometer (b) Potentiometer (c) Ammeter (d) Rheostat	K1	CO5
	6	Classify the metal which observe Positive Thomson effect. (a) Zn (b) Co (c) Pb (d) Cu	K2	CO2
4	7	Choose the value which is the square root of the average of I ² during a complete cycle. (a) Peak value (b) mean value (c) RMS value (d) virtual value	K1	CO5
	8	Relate the Time constant of an RL circuit . (a) $\lambda = 2L / R$ (b) $\lambda = L / R$ (c) $\lambda = L / 2R$ (d) $\lambda = R/L$	K2	CO2
5	9	Which of the following material has the highest Permeability? (a) soft Iron (b) Steel (c) Perm Alloy (d) Air	K1	CO5
	10	Relate the law from which ampere's circuital be derived (a) Gauss Law (b) Newton's Law (c) Kirchhoff's Law (d) Biot-savart Law	K2	CO2

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SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Outline the Gauss's Law of Electrostatics.	K2	CO2
	(OR)			
	11.b.	Illustrate the relation between Dielectric constant and Polarization.		
2	12.a.	Interpret the equation of Continuity.	K2	CO2
	(OR)			
	12.b.	Explain the Superposition Theorem.		
3	13.a.	Summarize and explain the Faraday's laws of Electrolysis.	K2	CO2
	(OR)			
	13.b.	Interpret the expression for Peltier and Thomson Coefficient.		
4	14.a.	Evaluate an expression for R.M.S value of an Alternating current.	K5	CO5
	(OR)			
	14.b.	Measure the time of leakage. If the charge on a capacitor of capacitance $2\mu\text{F}$ in leaking through a high resistance of 100 mega ohms is reduced to half its maximum value.		
5	15.a.	Prove the relation $B = \mu_0(H+M)$.	K5	CO5
	(OR)			
	15.b.	Interpret Ampere circuital law and its applications.		

SECTION - C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Develop Poisson's equation and Laplace equation.	K3	CO3
2	17	Explain Norton's network theorem. Show that the Norton's equivalent circuit can be found from the Thevenin's equivalent circuit.	K5	CO5
3	18	Show that the Peltier coefficient of a pair of metals is the product of the absolute temperature and Thermoelectric power.	K2	CO2
4	19	Deduct the measurement of high resistance by leakage.	K5	CO5
5	20	Justify Langevin's theory of i) Diamagnetism ii) Paramagnetism.	K5	CO5

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2024
(Third Semester)

Branch - **PHYSICS**

CHEMISTRY – I

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The IUPAC name for the coordination compound $[\text{CuCl}_2(\text{CH}_3\text{NH}_2)_2]$ is a) dichlorobis (dimethylamine) copper (II) b) dichlorobis (methylamine) copper (II) c) dimethylamine copper (II) chloride d) bis (dimethylamine) copper (II) chloride	K1	CO1
	2	Which of the following molecules geometry is true? a) XeF_2 – Triagonal pyramidal b) ClF_3 – T-shape c) PCl_5 – See-saw d) SF_4 – Triagonal bipyramidal	K2	CO1
2	3	Teflon is obtained from a) difluoroethene b) monofluoroethene c) tetrafluoroethene d) tetrafluoroethane	K1	CO2
	4	Which of the following is a basic dyes a) Congo Red b) Aniline Yellow c) Alizarin d) Indigo	K2	CO2
3	5	In cubic crystal, a given plane intercepts the axes at 6a, 3b and 3c. The miller indices of the plane is _____ a) (211) b) (122) c) (311) d) (133)	K1	CO3
	6	In diamond, the coordination number of carbon is _____ a) four and its unit cell has eight carbon atoms b) four and its unit cell has six carbon atoms c) six and its unit cell has four carbon atoms d) four and its unit cell has four carbon atoms	K2	CO3
4	7	For a reaction, the rate = $k[\text{A}]^2[\text{B}]$, when the initial concentration of A is tripled then the rate a) decreases by a factor of three b) decreases by a factor of six c) increases by a factor of six d) increases by a factor of nine	K1	CO4
	8	Gold number is the measure of a) stability of colloidal system b) coagulating power of a colloid c) size of colloidal particles d) efficiency of the protective colloid	K2	CO4

Cont...

5	9	Promoter is a substance which a) enhance the activity of catalyst b) enhances the concentration of the catalyst c) lowers the activation energy of reactions d) lowers the kinetic energy of reactant	K1	CO5
	10	The free energy of a photochemical reaction a) is always positive b) is always negative c) can be positive and negative d) is neither positive nor negative	K2	CO5

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain EAN rule and types of chelates.	K2	CO1
		(OR)		
	11.b.	Describe the postulates of Werner's theory.		
2	12.a.	Organize the isolation and uses of menthol and camphor.	K3	CO2
		(OR)		
	12.b.	Plan the preparation, properties and uses of polyester and polyacrylonitrile.		
3	13.a.	Categorize various elements of symmetry of a cubic crystal lattice.	K4	CO3
		(OR)		
	13.b.	Analyze Weiss and miller indices with example.		
4	14.a.	Solve the Derivation of rate constant for first order reactions.	K3	CO4
		(OR)		
	14.b.	Construct the Purification of sol by electrodialysis and ultrafiltration.		
5	15.a.	Distinguish between homogeneous and heterogeneous catalysis.	K4	CO5
		(OR)		
	15.b.	Survey about the Laws of photochemistry.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	List out the preparation, properties, structure and uses of interhalogen compounds i) ICl, ii) BrF ₃ , iii) IF ₇ .	K4	CO1
2	17	Inspect the general classification of alkaloids and explain the isolation and uses of i) coniine and ii) nicotine.	K4	CO2
3	18	Analyze the structure of NaCl and CsCl.	K4	CO3
4	19	Inference about the methods of determining order of reaction.	K4	CO4
5	20	Examine enzyme catalysis and its mechanism.	K4	CO5

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fourth Semester)

Branch – PHYSICS

OPTICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. The type of mirror which always forms a virtual image is a
 - a) concave mirror
 - b) convex mirror
 - c) plane mirror
 - d) spherical mirror
2. The secondary mirror used in Newton's telescope to reflect light into an eyepiece is a
 - a) Diagonal mirror
 - b) Parabolic mirror
 - c) Hyperbolic mirror
 - d) Planar mirror
3. The key difference between Fresnel and Fraunhofer diffraction is that
 - a) Fresnel diffraction occurs in the near field, while Fraunhofer diffraction occurs in the far field.
 - b) Fresnel diffraction involves a converging spherical wavefront, while Fraunhofer diffraction involves a parallel wavefront.
 - c) Fresnel diffraction occurs with coherent light, while Fraunhofer diffraction occurs with incoherent light.
 - d) Fresnel diffraction produces a single-slit diffraction pattern, while Fraunhofer diffraction produces a double-slit interference pattern.
4. What type of polarization is observed when the electric field vector of light waves trace out a helical path as it propagates?
 - a) Linear polarization
 - b) Circular polarization
 - c) Elliptical polarization
 - d) Random polarization
5. Which of the following is NOT a type of fiber optic sensor?
 - a) Intrinsic sensor
 - b) Extrinsic sensor
 - c) Distributed sensor
 - d) Refractive sensor

SECTION-B (15 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 3 = 15)

- 6 a). Explain the total internal reflection of light.
(or)
b). Explain how chromatic aberration in lenses separated by a distance.
- 7 a). Describe the construction and working of a Galileo's telescope.
(or)
b). With a neat diagram explain the construction and working of a constant deviation spectrometer.

Cont...

- 8 a). White light is incident on a soap film at an angle $\sin^{-1} 4/5$ and the reflected light is observed with a spectroscope. It is found that two consecutive dark bands corresponding to wavelengths $6.1 \times 10^{-7} \text{ m}$ are arising. If the refractive index of the film be $4/3$, calculate its thickness.
(or)
- b). Newton's rings are formed with red light having $\lambda = 670 \text{ nm}$. The radius of the 20th ring is found to be $1.1 \times 10^{-2} \text{ m}$. Find the radius of curvature of the lens and the radius of 30th ring.
- 9 a). Describe how a Nicol prism can be used as an analyzer.
(or)
- b). Give the Fresnel's explanation for the rotational polarization of light.
- 10 a). Mention the advantages of optical fibers.
(or)
- b). Explain the fiber optic communication system.

SECTION-C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 6 = 30)

11. (a) Explain spherical aberration in a lens. Explain how is it caused and the ways to minimize it.
(or)
- (b) What is coma? Hence give the theory of alplantism of thin lenses.
12. (a) Explain the principle, construction and working of a Newtonian telescope.
(or)
- (b) Give the construction and working of a Ramsden eyepiece. How are chromatic and spherical aberrations minimized in this eyepiece?
13. (a) Give the theory of interference of light by thin films. Hence explain the formation of Newton's Rings and the measurement of the wavelength of light using this experiment.
(or)
- (b) Discuss Fraunhofer diffraction due to a single slit. Draw a curve indicating distribution of light in the diffraction pattern.
14. (a) Discuss polarization phenomenon due to reflection of light waves. Hence state Brewster's law and explain any one of its applications.
(or)
- (b) Give the construction and working of a Laurent's half-shade polarimeter.
15. (a) Explain the construction and reconstruction of a hologram and the applications of holography.
(or)
- (b) Explain the principle and operation of any one fiber-optic sensors.

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fourth Semester)

Branch –PHYSICS

ELECTRONIC INSTRUMENTATION

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Which of the following is caused by careless handling?
(i) gross error (ii) systematic error
(iii) random error (iv) environmental error
- 2 A PMMC meter rated at 50 μ A is used in a rectifier type of instrument which uses full wave rectification. What is the sensitivity on sinusoidal a.c ?
(i) 20K Ω /V (ii) 9 K Ω /V
(iii) 18 K Ω /V (iv) 22.2 K Ω /V
3. Oscilloscope is a
(i) a ohmmeter (ii) an ammeter
(iii) a voltmeter (iv) a multimeter
- 4 Which transducer is known as self generating transducer?
(i) analog (ii) passive
(iii) secondary (iv) active
- 5 The heart sounds are recorded by
(i) Electro cardiography (ii) Endoscope
(iii) Angio cardiography (iv) Phono cardiography

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Briefly explain the static characteristics of an instrument.
OR
b Write a note on atomic frequency and time standards.
- 7 a Give the advantages of Ayrton shunt ammeter over multi range ammeters.
OR
b List the multimeter operating instructions.
- 8 a Explain the basic principle of an oscilloscope.
OR
b. Mention any three applications of oscilloscope.

Cont...

- 9 a Name the different types of piezoelectric transducer.
OR
b Explain the working principle of inductive transducer.
- 10 a Bring out the salient features of phonocardiography.
OR
b List the different modes of operation of the pacemakers.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks

(5 x 6 = 30)

- 11 a Explain the types of static errors in measurements.
OR
b Discuss the significance of dynamic characteristics in measurement systems.
- 12 a Discuss the calibration of the ohmmeter.
OR
b Explain the working of an AC voltmeter using a full wave rectifier.
- 13 a Describe the CRT features in detail.
OR
b Discuss how Lissajous method works for frequency measurement.
- 14 a Describe the operation of a strain gauge.
OR
b Describe the construction of a Linear Variable Differential Transducer(LVDT). Give its disadvantages.
- 15 a Draw the block diagram of echocardiography and explain its functions.
OR
b Describe the recording set up used in EMG.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fourth Semester)

Branch – PHYSICS

CHEMISTRY - II

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(5 x 1 = 5)

1. An agreement between a measured value and the accepted true value is
 - (i) Error
 - (ii) Accuracy
 - (iii) Precision
 - (iv) All of these
2. Detergent can be used in
 - (i) soft water only
 - (ii) hard water only
 - (iii) both soft and hard water
 - (iv) all the ionic solvents
3. What is the process called when the molecules of a substance are retained at the surface of a solid or a liquid?
 - (i) Absorption
 - (ii) Adsorption
 - (iii) Sorption
 - (iv) Desorption
4. In an isothermal process
 - (i) temperature remains constant
 - (ii) pressure remains constant
 - (iii) volume remains constant
 - (iv) Kinetic energy remains constant
5. According to Beer Lambert's law; $A = \epsilon Cl$, A is the
 - (i) Molar extinction coefficient of The solution
 - (ii) Concentration of the solution
 - (iii) Absorbance of the solute
 - (iv) path length of the light through the sample

SECTION - B (15 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks

(5 x 3 = 15)

6. a) Define: Normality and Molarity.
OR
b) Write the simple first aid procedure for accidents in laboratory.
7. a) Give one method of preparation of each of the following: (i) Furan
(ii) Pyridine
OR
b) Differentiate between soaps and detergents.
8. a) Describe buffer action.
OR
b) Write the difference between Chemisorption and Physisorption.

Cont...

9. a) Write the need for second law of thermodynamics.
OR
b) What are isothermal and adiabatic process?
10. a) Define with example: (i) Chromophore (ii) Auxochrome
OR
b) Write note on: (i) Hyperchromic shift (ii) Bathochromic shift.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks

(5 x 6 = 30)

11. a) How errors are classified?
OR
b) Explain (i) Confidence limit (ii) Standard deviation
12. a) Outline the properties and uses of amino acids.
OR
b) Describe the mechanism of cleaning action of soaps.
13. a) How equivalent conductance is determined by Kohlrausch law?
OR
b) Explain Langmuir adsorption isotherm.
14. a) Derive the relation between C_p and C_v
OR
b) Explain Joule – Thompson effect.
15. a) Discuss Lambert Beer's law
OR
b) Mention the applications of UV-Visible spectroscopy.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Branch – PHYSICS

QUANTUM MECHANICS AND RELATIVITY

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 The concept of matter wave was suggested by _____
(i) Heisenberg (ii) de Broglie
(iii) Schrodinger (iv) Laplace
- 2 According to uncertainty relation the minimum uncertainty in the velocity of electron orbiting around the nucleus of radius r is
(i) $h / 2\pi mr$ (ii) $h / 4\pi mr$
(iii) $2hmr$ (iv) 0
- 3 The time independent Schrodinger's equation of a system represents the conservation of the
(i) total energy of the system
(ii) total potential energy of the system
(iii) total kinetic energy of the system
(iv) total binding energy of the system
- 4 The Special theory of relativity deals with problems of mechanics in which one frame moves with _____ velocity relative to the other frame
(i) greater (ii) infinite
(iii) constant (iv) lesser
- 5 The clocks -----When gravitational forces are present
(i) faster (ii) slow down
(iii) inactive (iv) reversed

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a What is de-Broglie waves? Explain it.
OR
b Enumerate the quantum properties of micro particles.
- 7 a State and prove Heisenberg's uncertainty principle.
OR
b Show that non – existence of the electron in the nucleus by uncertainty principle
- 8 a Derive time dependent Schrodinger wave equation.
OR
b Explain the tunneling effect by barrier penetration.

Cont...

- 9 a State and explain Newtonian relativity.
OR
b State and deduce the mathematical expression for the law of addition of relativistic velocities.
- 10 a State and explain the principle of equivalence.
OR
b State and explain Einstein's law of gravitation.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Deduce Einstein's photoelectric equation.
OR
b Describe Davisson – Germer's experiment on diffraction of electron.
- 12 a Determine minimum energy of harmonic oscillator by the application of uncertainty principle.
OR
b Calculate the radius of the Bohr's first orbit with the help of Heisenberg's by uncertainty principle.
- 13 a Solve the Schrodinger wave equation of particle in a box.
OR
b Solve Schrodinger wave equation for linear harmonic oscillator.
- 14 a Obtain Einstein's mass-energy relation.
OR
b Discuss length-contraction.
- 15 a Discuss the gravitation curved space and time.
OR
b Determine the experimental verification of procession of perihelion of Mercury.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Branch – PHYSICS

MATHEMATICAL PHYSICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Which of the following theorem convert line integral to surface integral?
(i) Gauss divergence and Stokes theorem (ii) Stokes theorem only
(iii) Green's theorem only (iv) Stokes and Green's theorem only
- 2 Divergence of the curl of a twice differentiable continues vector function is _____.
(i) Unity (ii) Infinity (iii)) Zero (iv) A unit vector
- 3 The Caley-Hamilton theorem deals only with _____ matrices.
(i) Unitary (ii) Inverse (iii) Square (iv) Orthogonal
- 4 Laplace transform if $\sin(at)u(t)$ is?
(i) s/a^2+s^2 (ii) a/a^2+s^2 (iii) s^2/a^2+s^2 (iv) a^2/a^2+s^2
- 5 Which of the following theorems can be applied in the function of Cauchy's Integral Theorem?
(i) Green's (ii) Stoke's
(iii) Gauss Divergence (iv) Taylor's

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Explain Stokes Theorem.
OR
b Define Kronecker delta symbol and List the properties of Kronecker delta.
- 7 a Interpret Gradient in orthogonal Curvilinear coordinates.
OR
b Write the differential operators Gradient, Divergence and Curl of spherical coordinates.
- 8 a Find the Eigen values and normalized eigen vectors of the matrix .

1	0	0
0	1	1
0	1	1

OR

- b Diagonalise the following matrices?

4/3	$\sqrt{2}/3$
$\sqrt{2}/3$	5/3

$\cos \theta$	$-\sin \theta$	0
$\sin \theta$	$\cos \theta$	0
0	0	1

- 9 a. Find the sine transform of e^{-ax}/x .
OR
b. State any two properties of Laplace Transforms.

Cont...

- 10 a. What is an analytical function. Derive necessary and sufficient conditions for a function to be analytic.

OR

- b. State and Prove Cauchy's integral theorem.

$$\int_c f(z) dz = 0$$

SECTION -C (30 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 x 6 = 30)

- 11 a State and Prove Gauss Divergence theorem.

OR

- b Introduce the two expressions of christoffel's 3-index symbols and Derive the relation between first and second kind.

- 12 a Derive an equation for div V in orthogonal curvilinear coordinates.

OR

- b Write the differential operators Gradient, Divergence and Curl of cylindrical coordinates.

- 13 a.(i) Show that the Eigen values of a matrix are invariant under similarity transformation.

(ii) Show that the following matrices are Orthogonal

[A] =	cos θ	-sin θ	0
	sin θ	cos θ	0
	0	0	1

[B] =	cos θ	0	sin θ
	0	1	0
	-sin θ	0	cos θ

OR

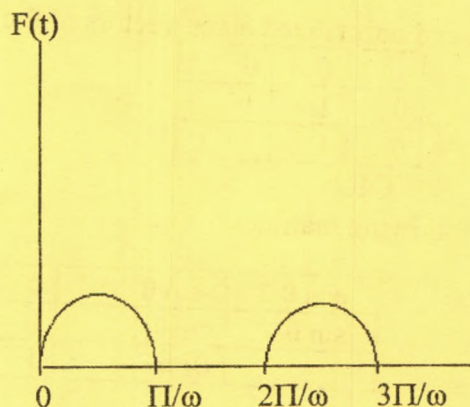
- b Find the characteristic equation of the following matrix and verify the Cayley-Hamilton theorem.

1	2	3
2	-1	4
3	1	1

- 14 a Represent the equations of finite fourier sine and cosine transform

OR

- b Obtain the laplace transform of half wave rectifier function as shown in the figure



- 15 a State and prove the cauchy's riemann equations for a function of a complex variable to be analytic.

OR

- b. State and Prove Cauchy's integral formula. $f(z_0) = \frac{1}{2\pi i} \int_c \frac{f(z) dz}{(z-z_0)}$

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)
Branch – PHYSICS

PRINCIPLES OF DIGITAL ELECTRONICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 Convert the hexadecimal number 1A3 to its decimal equivalent.
(i) 419 (ii) 421
(iii) 432 (iv) 499
- 2 Which of the following is a universal gate?
(i) AND gate (ii) OR gate
(iii) NAND gate (iv) NOR gate
- 3 Identify the primary function of a BCD Adder.
(i) Add two binary numbers (ii) Add two BCD numbers
(iii) Subtract binary numbers (iv) Convert binary numbers to decimal
- 4 What type of flip-flop is characterized by having a single data input and a clock input?
(i) SR Flip-Flop (ii) D Flip-Flop
(iii) JK Flip-Flop (iv) T Flip-Flop
- 5 What is the function of a 555 Timer in an astable mode?
(i) Generate a single pulse
(ii) Operate as a Schmitt Trigger
(iii) Generate a continuous square wave
(iv) Delay a pulse

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a) Explain how you would convert the binary number 1101 to its decimal equivalent.
OR
b) Describe the signed binary numbers with example.
- 7 a) Analyze the truth table of a NAND gate and describe its logic operation.
OR
b) Explain the procedure to simplify a Boolean expression using a Karnaugh map for a three-variable function.
- 8 a) Describe the functioning of Full Adder circuit and its application in binary addition.
OR
b) Draw a logic diagram of 1 to 4 line demultiplexer.

Cont...

- 9 a) Explain how a D flip-flop operates and its role in sequential circuits.
OR
b) Outline the steps to design a simple ring counter using flip-flops.
- 10 a) Describe the operation of a Binary Weighted Resistor D/A converter and its application.
OR
b) Sketch the internal structure of a 555 Timer and explain its use in an astable multivibrator mode.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a) Analyze the conversion process between various number systems (binary, octal, decimal, and hexadecimal). Provide an example of converting a number from each system to decimal and explain the steps involved.
OR
b) Discuss the process and steps involved in performing binary arithmetic operations: addition, subtraction, multiplication, and division.
- 12 a) How to prove the sum of products and product of sums are equivalent to one another in XOR function?
OR
b) Analyze the impact of De Morgan's Theorems on simplifying complex Boolean expressions. Provide examples to illustrate their use.
- 13 a) Describe the design and working principle of a 4-bit binary adder circuit. Include a discussion on its components and how it performs addition.
OR
b) Examine the process and application of converting binary numbers to Gray code and vice versa. Include examples for clarity.
- 14 a) Discuss the design and operation of synchronous counters and compare them with asynchronous counters. Highlight their advantages and disadvantages.
OR
b) Elucidate the concept and functionality of shift registers. Discuss their types (serial-in serial-out, parallel-in parallel-out) and their applications in data manipulation.
- 15 a) Discuss the principles and applications of Counter-type and Successive Approximation A/D converters. Compare their advantages and disadvantages.
OR
b) Design an astable multivibrator using 555 timer.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Branch – PHYSICS

MAJOR ELECTIVE COURSE - I : SEMICONDUCTOR ELECTRONICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 What bonds are present in a semiconductor?
(i) monovalent (ii) bivalent
(iii) trivalent (iv) covalent
- 2 A transistor has ----- pn junctions
(i) one (ii) two
(iii) three (iv) four
- 3 Feedback circuit is ----- of frequency
(i) independent (ii) strongly dependent
(iii) moderately dependent (iv) none of the above
- 4 Hartely oscillator is commonly used in
(i) radio receivers (ii) radio transmitters
(iii) TV receivers (iv) none of the above
- 5 The gate of a JFET is ----- biased
(i) reverse (ii) forward
(iii) reverse as well as forward (iv) none of the above

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Explain the variation of fermi level with temperature in semiconductor.
OR
b Draw a volt-ampere characteristics of pn junction.
- 7 a Draw the input and output characteristics of CB connection.
OR
b Draw the diagram for pull push amplifier.
- 8 a What is the principles of negative voltage feedback in amplifiers with a neat diagram.
OR
b Draw a digram for DC regulated power supply.

Cont...

- 9 a Write down the principle of Hartely oscillator with a neat sketch.

OR

- b Define amplitude modulation with example.

- 10 a Give the circuit diagram for clamping circuit.

OR

- b Elucidate SCR as full wave rectifier.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks

(5 x 6 = 30)

- 11 a Derive an expression of carrier concentration in n-type semiconductor.

OR

- b With a neat sketch, explain full wave bridge rectifier.

- 12 a Describe the various methods used for biasing in detail.

OR

- b Explain RC coupled amplifier with a frequency response.

- 13 a Explain the following of OP-AMP

(i) Inverting amplifier

(ii) non- Inverting amplifier

OR

- b Explain the following of OP-AMP

(i) Adder

(ii) subtractor

- 14 a Describe Wein bridge oscillator with a neat diagram.

OR

- b Explain different parts of super heterodyne receiver.

- 15 a With a suitable diagram, explain astable multivibrator.

OR

- b Explain the construction and working of MOSFET.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Sixth Semester)

Branch – PHYSICS

NUCLEAR PHYSICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. A beta- particle is also known as
 - (i) an Electron
 - (ii) a Positron
 - (iii) a Helium nucleus
 - (iv) a Photon
2. Radio carbon dating is used to estimate the age of
 - (i) Soil
 - (ii) Soils
 - (iii) Fossils
 - (iv) Buildings
3. A cyclotron can accelerate
 - (i) β particles
 - (ii) α particles
 - (iii) High-velocity gamma rays
 - (iv) High-velocity X rays
4. Which of the following is used as a fuel in Nuclear Reactor?
 - (i) Co-60
 - (ii) U-235
 - (iii) P-32
 - (iv) I-131
5. The Particles that participate in the strong nuclear interaction are called
 - (i) Neutrinos
 - (ii) Hadrons
 - (iii) Leptons
 - (iv) Photons

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

6. a) Discuss the Range of the alpha particles by Experiment measurements.
OR
b) Explain the main features of the nuclear shell model. What are the magic numbers?
7. a) Discuss about the origin of Line and continuous spectrum.
OR
b) Explain about nuclear isomerism.
8. a) With a neat diagram, explain the principle, construction and working of Wilson Cloud Chamber.
OR
b) Discuss about the construction and working of the scintillation counters.

Cont ...

9. a) Explain the Q value of nuclear reactions and write its significance.

OR

- b) Summarize the applications of radioisotopes.

10. a) Describe about Primary and Secondary Cosmic rays.

OR

- b) Discuss about the Pair production and annihilation.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

11. a) Derive the equation of Gamow's Theory of Alpha Decay.

OR

- b) Discuss about the liquid drop model of the Nucleus and deduce semi-empirical mass formula.

12. a) Explain the Neutrino theory of Beta Decay and k-electron capture.

OR

- b) Infer the law of successive disintegration and Radioactive Dating.

13. a) With a neat diagram, explain the principle, construction and working of Cyclotron.

OR

- b) With a neat diagram, explain the principle, construction and working of Betatron.

14. a) Describe the construction and working of nuclear reactor.

OR

- b) Define chain reaction. Explain the critical size for maintenance of chain reaction.

15. a) Elucidate latitude, altitude and east-west symmetry of cosmic rays.

OR

- b) Enumerate the classification of Elementary Particles.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Sixth Semester)

Branch – PHYSICS

MATERIALS SCIENCE

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. Which of the following is characteristic of non-crystalline structures?
(i) Long range of periodicity (ii) Well defined structure and geometry
(iii) Low density (iv) Sharp diffraction pattern
2. What is the process of producing electric dipoles inside the dielectric by an external electric field?
(i) Polarisation (ii) Dipole moment
(iii) Susceptibility (iv) Magnetisation
3. The magnetic properties of a material are due to the existence of _____
(i) Electrons in atoms (ii) Electric dipole moment
(iii) Magnetic dipole moment (iv) None of the mentioned
4. A material with one dimension in Nano range and the other two dimensions are large is called _____
(i) Micro-material (ii) Quantum wire
(iii) Quantum well (iv) Quantum dot
5. Which of the following is used in electron microscope?
(i) Electron beams (ii) Magnetic fields
(iii) Light waves (iv) Electron beams and magnetic fields

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

6. a) Explain space lattices and crystal structure.
(OR)
b) Write a note on crystal directions and planes.
7. a) Distinguish between intrinsic and extrinsic semiconductors.
(OR)
b) Explain about the electric breakdown.

Cont

8. a) Write a note on domain theory of ferromagnetic material.
(OR)
b) Explain the structure of long chain polymers.
9. a) Write a note on classification of nanomaterials.
(OR)
b) Explain about the particle size analyser.
10. a) Write about the principle and working of electron microscope.
(OR)
b) Write a note on photo elastic and ultrasonic method in NDT.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

11. a) Discuss in detail about the imperfections and dislocations in crystals.
(OR)
b) Write a note on crystal directions and planes.
12. a) Describe in detail about the free electron theory of conductor.
(OR)
b) Explain about the temperature and frequency effects of polarisation.
13. a) Explain about the classical theory of paramagnetic material.
(OR)
b) Write a note on ferrites.
14. a) With neat diagram, explain the principle, construction and working of TEM.
(OR)
b) Explain about the liquid phase synthesis.
15. a) Explain, how to produce ultrasonic waves using magnetostriction ultrasonic generator with neat sketch.
(OR)
b) Write a note on X-ray radio graphic method.

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Sixth Semester)

Branch – PHYSICS

DISCIPLINE SPECIFIC ELECTIVE – II : ALTERNATE ENERGY RESOURCES

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 The Oil Crisis has been started in the year
(i) 1963 (ii) 1973
(iii) 1983 (iv) 1993
- 2 Which of the following is not a performance indices of Solar Collectors?
(i) Collector Efficiency (ii) Concentration Ratio
(iii) Temperature Range (iv) Area of the Collector
- 3 Which of the following is a common source for producing biofuels?
(i) Plastic (ii) Coal
(iii) Corn (iv) Glass
- 4 Which of the following country has the greatest geothermal energy production?
(i) United States of America (ii) Italy
(iii) Japan (iv) China
- 5 What is the primary function of a fuel cell?
(i) to store electrical energy
(ii) to generate heat through combustion
(iii) to store mechanical energy
(iv) to convert chemical energy directly into electrical energy

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Describe the advantages and disadvantages of Conventional Energy sources.
OR
b Explain the Energy Scenario of Conventional and Non-Conventional Energy Sources in India.
- 7 a Explain the construction and working of a Solar Water Heater.
OR
b Discuss in detail about the Solar desalination process.
- 8 a Write a brief note on Biofuels.
OR
b Describe the mechanism of biomass gasification.

Cont...

- 9 a How the Geothermal Fields are classified based on temperature?
OR
b Brief about the process of exploration and development of Geothermal Energy in India.
- 10 a Explain in detail about the process of Hydrogen storage.
OR
b Derive the expression for the efficiency of a Fuel cell.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Discuss in detail about the different energy sources and their role.
OR
b Explain briefly about the common form of Energy.
- 12 a Describe a detailed note on Solar passive heating and cooling system.
OR
b Explain the types of Solar Green House and its implications.
- 13 a Explain briefly about biomass conversion technologies.
OR
b With a neat sketch, discuss in brief about the types of biogas plants.
- 14 a Discuss in brief about the types of Hydrothermal and Geopressurized resources.
OR
b Highlight the importance and significance of Hot Dry Rocks and Magma resources.
- 15 a Describe about the methodologies of producing Hydrogen for industrial applications.
OR
b Explain the construction and working of Phosphoric Acid Fuel Cell (PAFC) and Alkaline Fuel Cell (AFC). Also mention its advantages and drawbacks.

Z-Z-Z

END