

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

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

Branch - PHYSICS

NUCLEAR AND PARTICLE 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	The binding energy of deuteron is a) 2.0 MeV b) 2.7 MeV c) 2.2 MeV d) 2.5 MeV	K1	CO1
	2	The strong nuclear force is independent of which of the following? a) Charge b) Spin c) Mass d) Nuclear range	K2	CO1
2	3	The only positive term in the Bethe – Weizacker semi-empirical mass formula is? a) Surface b) Volume c) Symmetry d) Coulomb	K1	CO2
	4	Which of the following is a magic number? a) 52 b) 21 c) 7 d) 28	K2	CO2
3	5	Which type of radioactive decay has not changed the atomic number? a) alpha b) beta c) gamma d) isotopes	K1	CO3
	6	In a β^+ decay which of the following is released? a) Neutrino b) Anti-neutrino c) Photon d) Electron	K2	CO3
4	7	The nuclear reaction cross section is measured in barns, what is 1 barn equal to? a) 10^{-10} m^2 b) 10^{-23} m^2 c) 10^{-34} m^2 d) 10^{-28} m^2	K1	CO4
	8	Most of the energy released in the fission process is in the process of _____ a) Kinetic energy b) Thermal energy c) Light energy d) Heat energy	K2	CO4
5	9	Which among the following is not a hadron? a) Proton b) Neut c) Pion d) Electron	K1	CO5
	10	Quark composition of the neutron is? a) u u d b) u d d c) u d s d) u s s	K2	CO5

Cont...

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.	What is the evidence of shell structure in nuclei? Explain the main assumptions of the nuclear shell model.	K2	CO1
		(OR)		
	11.b.	What is the binding energy of a nucleus? Draw the curve of binding energy per nucleon against mass number of nuclei and discuss the main features of the curve.		
2	12.a.	Write a short note on Binomial and Poisson distribution.	K2	CO2
		(OR)		
	12.b.	Outline Fermi's theory to explain the continuous energy spectrum in beta decay.		
3	13.a.	Discuss the Yukawa theory of Nuclear Forces.	K2	CO3
		(OR)		
	13.b.	What are deuterons?. State and explain properties of the ground state of deuterons.		
4	14.a.	Explain the process of a nuclear reaction, distinguishing between direct reactions and compound nucleus formation.	K3	CO4
		(OR)		
	14.b.	Summarize the physical and chemical effects of radiation on agriculture.		
5	15.a.	Discuss the classification of elementary particles based on their intrinsic properties.	K1	CO5
		(OR)		
	15.b.	Discuss the conservation laws of elementary particles with examples.		

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	Outline the basic assumptions of the liquid drop model of the nucleus and describe how this model is used to estimate the semi-empirical mass formula?	K2	CO1
2	17	Explain Gamow's theory of alpha decay and deduce the Geiger-Nuttall law.	K2	CO2
3	18	Show that differential scattering cross section is independent of scattering angle for neutron-proton scattering using partial wave analysis.	K2	CO3
4	19	Define nuclear fission and explain Bohr and Wheeler's theory of nuclear fission.	K4	CO4
5	20	Explain in detail the quark model.	K5	CO5

Z-Z-Z

END

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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.	Elucidate the types of crystal structure.	K1	CO1
		(OR)		
	11.b.	Outline the crystal imperfection.		
2	12.a.	Analyze the Hall effect.	K2	CO2
		(OR)		
	12.b.	Derive the Clausius Mosotti relation.		
3	13.a.	Interpret the Einstein's model for density of states.	K2	CO2
		(OR)		
	13.b.	Analyze the thermal resistance of phonon gas.		
4	14.a.	Explain the Langevin's classical theory of diamagnetism.	K1	CO1
		(OR)		
	14.b.	Describe the Weiss molecular theory for ferromagnetic materials.		
5	15.a.	Enumerate the Meissner effect.	K1	CO1
		(OR)		
	15.b.	Explain the DC Josephson effect.		

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	Explain the structure factor of FCC and BCC.	K1	CO1
2	17	Discuss the Kroenig Penny model.	K1	CO1
3	18	Interpret the Debye's model for density of states.	K2	CO2
4	19	Explain the Langevin's quantum theory of diamagnetism.	K1	CO1
5	20	Analyze the BCS theory.	K2	CO2

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024

(First Semester)

Branch - PHYSICS

QUANTUM MECHANICS- 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	If the matrix A of transformation is unitary, the linear transformation is said to be -----transformation. a.orthogonal b. unitary c.similarity d. nontrivial	K1	CO1
	2	Which of the following statement is WRONG, regarding Hilbert space? a. It is a vector space b. It has complex and countable dimensions c. All infinite series occurring in it are divergent d. wavefunctions associated with it are represented as vector sum of its components along the axes.	K2	CO1
2	3	A -----operator is defined as an operator which, when applied to a state, creates a new state with a raised or lowered eigenvalue. a. Momentum b. energy c. time d. ladder	K1	CO2
	4	According to Dirac, each wave function ψ can be associated with a state vector called ----and the complex conjugate wave function are associated with the quantity called -----. a. Ket, bra b. bra, ket c. bra, Hermite d. Ket, Hermite	K2	CO2
3	5	-----is NOT an example of perturbation theory. a. systems with linear contributions to the equation of motion b. systems with nonlinear contributions to the equation of motion c. tiny shifts in the spectral lines caused by electric field d. alterations to an objects orbit due to gravitational interactions with other bodies	K1	CO3
	6	The WKB approximation will be suitable in cases where the V is a. smooth and varying function of position b. constant potential c. infinite potential d. discrete	K2	CO3
4	7	Which of the following statement is WRONG in the case of adiabatic approximation? a. The perturbation is turned fast b. The solutions of schrodinger wave equations are approximated by means of instantaneous H c. $\langle m \frac{\partial H}{\partial t} k \rangle$ should be appreciable d. It occurs in the collision of gas molecules	K1	CO4
	8	In sudden approximation the variation of ----- cannot be neglected. a. $\frac{\partial V}{\partial t}$ b. $\frac{\partial \omega}{\partial t}$ c. $\frac{\partial H}{\partial t}$ d. $\frac{\partial \psi}{\partial t}$	K2	CO4
5	9	The state vector changes with time, but the operator remains constant with time is called a. Schrodinger picture b. Interaction picture c. Heisenberg picture d. Dirac picture	K1	CO5
	10	The method of second quantization can be applied to ----- system. a. many particle b. single particle c. degenerate d. nondegenerate	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.	Find the eigen values and the eigenvectors of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 3 & 6 \end{bmatrix}$	K2	CO1
		(OR)		
	11.b.	Show by example how the operators are represented into a matrix form.		
2	12.a.	Show that an operator which commutes with J_x and J_y , commutes with J_z also.	K4	CO2
		(OR)		
	12.b.	Build the angular momentum matrices for $j=1/2$, and $j=3/2$.		
3	13.a.	Discuss the time independent perturbation theory and obtain expressions for the first order correction to energy and eigen function.	K3	CO3
		(OR)		
	13.b.	Discuss the stationary perturbation theory for the degenerate case.		
4	14.a.	Compare adiabatic and sudden approximation methods.	K4	CO4
		(OR)		
	14.b.	Analyze the time dependant perturbation for a Harmonic perturbation.		
5	15.a.	Describe Schrodinger picture.	K3	CO5
		(OR)		
	15.b.	Describe Heisenberg Picture.		

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 transformation from x to p is unitary and evaluate the transformation matrix.	K4	CO1
2	17	Obtain Clebch Gordan coefficients for the addition of orbital and spin angular momentum for electron in p state.	K4	CO2
3	18	Describe the WKB approximation method for the solution of Schrodinger wave equation in a potential field and discuss its validity.	K4	CO3
4	19	Develop Fermi Golden rule for constant perturbation that acts for a short interval of time. Apply it to find the transition rate of α sattering.	K4	CO4
5	20	Analyze the method of Second Quantisation.	K4	CO5

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch - PHYSICS

ADVANCED OPTICAL 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	The light waves which travel only in a single plane is known as a. Polarised light b. Unpolarised light c. Spherical light d. Rectilinear light	K1	CO1
	2	Birefringence depends on a. Refractive index b. Vibration of light c. Intensity of light d. Velocity of light	K2	CO1
2	3	The process of difference-frequency generation is a. Ferrometric b. Parametric c. Diametric d. Antiferrometric	K1	CO2
	4	Linear susceptibility is associated with the movement of ----- as light passes through a medium. a. Electrons b. Protons c. Phonons d. Photons	K2	CO2
3	5	Polarisability is depends on the direction of a. Induced dipole b. Spontaneous dipole c. Permanent dipole d. All the above	K1	CO3
	6	The decay-length of evanescent surface wave from scanning tunneling microscope is a. 100 cm b. 100 mm c. 100 nm d. 100 m	K2	CO3
4	7	Large number of dipole-dipole interaction is present in a. Proteins b. Aminoacids c. Carbon d. Hydrogen	K1	CO4
	8	Photonic crystals can be fabricated for ---- dimension. a. One b. Two c. Three d. All	K2	CO4
5	9	Diffraction is a special type of a. Reflection b. Refraction c. Scattering d. Dispersion	K1	CO5
	10	The diffracting aperture is a ---- source of propagating wave. a. Primary b. Secondary c. Coherent d. Incandescent	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.	Explain the phenomenon of Dichroism.	K4	CO1
	(OR)			
	11.b.	Compare the spatial and temporal coherence.		
2	12.a.	Derive the difference-frequency generation equation.	K3	CO2
	(OR)			
	12.b.	Calculate the linear susceptibility of an atomic system by density matrix equation of motion.		
3	13.a.	Describe briefly multiple multipole method.	K4	CO3
	(OR)			
	13.b.	Explain the construction and working of aperture scanning near-field optical microscopy.		
4	14.a.	Discuss about the dipole-dipole interaction.	K2	CO4
	(OR)			
	14.b.	Explain the photonic crystals.		
5	15.a.	Explain Kirchhoff's formulation of diffraction.	K4	CO5
	(OR)			
	15.b.	Discuss about Fraunhofer diffraction.		

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	Discuss in detail construction and reconstruction process of hologram.	K4	CO1
2	17	Deduce an expression of coupled-wave equations for Sum-Frequency generation.	K5	CO2
3	18	Explain in detail principle, construction and working of confocal microscopy.	K4	CO3
4	19	Describe in detail delocalized excitation with relevant theory and illustration.	K6	CO4
5	20	Explain the Rayleigh- Sommerfeld's formulation of diffraction.	K5	CO5

Z-Z-Z

END

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

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

Branch - PHYSICS

MATHEMATICS – II 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	The equation _____ is called the characteristic equation of the matrix A. (a) $\phi(\lambda) = 0$ (b) $\phi(\lambda) \neq 0$ (c) $\phi(\lambda) > 0$ (d) $\phi(\lambda) < 0$	K1	CO1
	2	The characteristic equation of the matrix A is _____. (a) $ A + \lambda I = 0$ (b) $ A - \lambda I = 0$ (c) $ A - \lambda I > 0$ (d) $ A - \lambda I < 0$	K2	CO1
2	3	A solution containing as many arbitrary constants as there are independent variables is called a _____. (a) complete integral (b) particular integral (c) singular integral (d) general integral	K1	CO2
	4	A solution obtained by giving particular values to the arbitrary constants in a complete integral is called a _____. (a) complete integral (b) particular integral (c) singular integral (d) general integral	K2	CO2
3	5	Pick the correct answer. $L(\sin 2t)$ is (a) $\frac{2}{s^2 + 4}$ (b) $\frac{s}{s^2 + 4}$ (c) $\frac{2}{s^2 - 4}$ (d) $\frac{s}{s^2 - 4}$	K1	CO3
	6	$L^{-1}\left[\frac{1}{s}\right] =$ _____. (a) 1 (b) 0 (c) 1/s (d) s	K2	CO3
4	7	If $f(x) =$ _____ then $f(x)$ is said to be even function (a) $f(x)$ (b) $-f(-x)$ (c) $f(-x)$ (d) $f(x^2)$	K1	CO4
	8	The Fourier series expansion of an even function contains (a) sine terms only (b) cosine terms only (c) both sine and cosine terms (d) neither sine nor cosine terms.	K2	CO4
5	9	If $f(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} F(s)e^{-ixs} ds$ is (a) Fourier transform (b) Fourier integral theorem (c) Fourier cosine transform (d) Fourier sine transform	K1	CO5
	10	$F(s)$ is a complex function if $f(t)$ is a _____ function. (a) real even (b) real (c) real odd (d) real even	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.	Find the eigen values of the matrix $\begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$	K3	CO1
		(OR)		
	11.b.	Calculate A^4 when $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$.		
2	12.a.	Solve $p^2 + q^2 = npq$	K3	CO2
		(OR)		
	12.b.	Solve $p(1 + q^2) = q(z - 1)$		
3	13.a.	Find $L(\sin^3 2t)$	K3	CO3
		(OR)		
	13.b.	Find $L^{-1} \left[\frac{1}{s(s+1)(s+2)} \right]$.		
4	14.a.	Express $f(x) = \frac{1}{2}(\pi - x)$ as a Fourier series with period 2π , to be valid in the interval 0 to 2π .	K3	CO4
		(OR)		
	14.b.	Express $f(x) = x$ ($-\pi < x < \pi$) as a Fourier series with period 2π .		
5	15.a.	Find $F_c \{e^{-ax}\}$ and $F_s \{e^{-ax}\}$.	K3	CO5
		(OR)		
	15.b.	Find the Fourier cosine transform for $F(x)$ if $f(x) = \begin{cases} 1 & \text{when } x < 1 \\ 0 & \text{when } x > 1 \end{cases}$		

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	Diagonalise the matrix $\begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$	K3	CO1
2	17	Solve $(y^2 + z^2)p - xyq = -xz$	K3	CO2
3	18	Solve the equation $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = \sin t$ given that $y = \frac{dy}{dt} = 0$ when $t = 0$.	K3	CO3
4	19	Show that $x^2 = \frac{\pi^2}{3} + 4 \sum_{n=1}^{\infty} (-1)^n \frac{\cos nx}{n^2}$ in the interval $(-\pi \leq x \leq \pi)$. Deduce that (i) $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \dots = \frac{\pi^2}{12}$ (ii) $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots = \frac{\pi^2}{6}$ (iii) $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$	K3	CO4
5	20	Find $F_c \{e^{-a^2x^2}\}$ and $F_s \{xe^{-a^2x^2}\}$ and show that $e^{x^2/2}$ is self reciprocal under Fourier cosine transform and $Xe^{-\frac{x^2}{2}}$ is self reciprocal under Fourier sine transform.	K3	CO5

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(Third Semester)

Branch: PHYSICS

PHOTONICS AND APPLICATIONS

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 life time of atoms in ground state for stimulated absorption? a) 1s b) 1 minute c) 1 hour d) Infinity	K1	CO1
	2	Show the characteristics of laser beam. a) Highly directional b) Highly intense c) Highly monochromic d) All of them	K2	CO2
2	3	Which medium is suitable for Optical Pumping? a) Transparent to light b) Not transparent light c) Metallic d) Non metallic	K1	CO1
	4	Interpret the major role played by an optical resonator. a) Stimulating more and more atoms from excited state to ground state b) Generation of intense laser output c) Generation unidirectional beam of photons d) All of them	K2	CO2
3	5	List how Ruby lasers works? a) Non pulses mode due to the high pump energy b) Pulsed mode due to the high pump energy c) Pulsed mode due to the low pump energy d) Non pulse mode due to the low pump energy	K1	CO1
	6	Outline the main advantage of gas lasers. a) They can operate in the pulse mode b) They cannot be operate continuously c) They can operate continuously d) They cannot operate in the pulse mode	K2	CO2
4	7	Which characteristic of laser allows it to be used in holography? a) Coherence b) Directionality c) Intensity d) Mono chromaticity	K1	CO1
	8	Outline the purpose why Laser is used in LIDAR? a) High speed photography b) Range finder c) Optical carrier signal d) drilling	K2	CO2
5	9	What determines light intensity in a CRT? a) Voltage b) Current c) Momentum of Electrons d) Fluorescent screen	K1	CO1
	10	Relate the material for fabrication of an LED. a) Gallium arsenide b) Gallium arsenide phosphide c) Indium antimonite d) Indium antimonite phosphide	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.	Explain the principle of laser action.	K2	CO2
		(OR)		
	11.b.	Interpret the conditions for laser oscillations.		
2	12.a.	Explain optical pumping.	K2	CO2
		(OR)		
	12.b.	Compare active and passive methods of mode locking.		
3	13.a.	Explain about Ruby laser.	K2	CO2
		(OR)		
	13.b.	Explain dye laser.		
4	14.a.	List out some application of LASER.	K4	CO3
		(OR)		
	14.b.	Analyze Inter ferrometric methods.		
5	15.a.	Examine Photoluminescence with a neat diagram.	K4	CO3
		(OR)		
	15.b.	Classify the Numeric displays.		

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	Distinguish absorption, spontaneous and stimulated emission with a neat diagram.	K4	CO3
2	17	Summarize three level and four level laser in detail.	K2	CO1
3	18	Interpret and Explain He-Ne laser with a neat diagram.	K2	CO5
4	19	Outline and Explain LIDAR in detail.	K2	CO2
5	20	Summarize Photoluminescence with a neat diagram.	K2	CO5

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(Third Semester)

Branch – PHYSICS

ELECTROMAGNETIC THEORY

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	Which of the following phenomenon is experienced by the dipoles in an electric field? a) Interference b) Magnetisation c) Electromagnetism d) Polarisation	K1	CO1
	2	Illustrate the Clausius –Mossotti equation's applicability in _____ dielectrics. a) Solid b) Liquid c) Gas d) Plasma	K2	CO3
2	3	Which of the given materials is a good dielectric? a) Iron b) Ceramics c) Plastic d) Magnesium	K1	CO1
	4	Illustrate the parameter calculated by using Biot Savart law. a) Magnetic field intensity b) Magnetic flux density c) Electric field intensity d) Permeability	K2	CO3
3	5	Name the pole in which magnetic field is strongest at a) North pole b) South pole c) both the poles d) Middle of the magnet	K1	CO1
	6	Illustrate which law is based on the first Maxwell law. a) Ampere law b) Faraday law c) Lenz law d) Faraday and Lenz law	K2	CO3
4	7	Which parameter will be unity in free space? a) Permittivity b) Absolute Permittivity c) Relative Permittivity d) Permeability	K1	CO1
	8	Show the waves which donot require any medium for propagation. a) Sound waves b) Light waves c) Electromagnetic waves d) Seismic waves	K2	CO3
5	9	Which Phenomena is employed in the wave guide operation is _____. a) Reflection b) Refraction c) Total internal reflection d) Absorption	K1	CO1
	10	Interpret the power component calculated by the Poynting vector. a) Product of E and H b) Ratio of E and H c) Dot product of E and H d) Cross product of E and H	K2	CO3

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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.	Explain the potential due to an electric Quadrapole.	K5	CO5
	(OR)			
	11.b.	Prove Clausis - Mosotti equation.		
2	12.a.	Interpret the frequency dependence in the presence of dielectric.	K5	CO5
	(OR)			
	12.b.	Explain Biosavart's law.		
3	13.a.	How is the expression for emf induced in a moving conductor derived?	K1	CO1
	(OR)			
	13.b.	Define the Lawrence condition.		
4	14.a.	What do you mean by homogeneous and isotropic medium?	K1	CO1
	(OR)			
	14.b.	Define the propagation of plane electromagnetic waves in conducting media.		
5	15.a.	Compare TE and TM waves.	K5	CO5
	(OR)			
	15.b.	Estimate Poynting vectors.		

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	Determine Poisson's equation and Laplace's equation.	K5	CO5
2	17	Explain Ampere's Circuital Law.	K2	CO1
3	18	Derive Maxwell's equation.	K5	CO5
4	19	Outline an equation for Plane wave propagation through a good conductor.	K2	CO1
5	20	What is the relationship between magnetic field and vector potential?	K1	CO1

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(Third Semester)

Branch - PHYSICS

MAJOR ELECTIVE COURSE – I DIGITAL COMMUNICATIONS

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 process of changing the amplitude of a relatively high frequency carrier signal in proportion with the instantaneous value of the modulating signal. a) Frequency modulation b) Amplitude modulation c) Carrier wave modulation d) Signal modulation	K1	CO1
	2	A signal is a _____ that carries data from one network to another. a) Electromagnetic b) Electrical current c) Electronic sign d) Magnetic	K2	CO1
2	3	FM bandwidth is approximated using _____ rule. a) Carson's b) Faraday's c) Maxwell's d) Armstrong's	K1	CO2
	4	For a phase modulated signal, the frequency deviation is proportional to _____. a) frequency only b) amplitude only c) only width d) phase only	K2	CO2
3	5	The instantaneous phase of the carrier is directly proportional to the _____ signal. a) carrier b) modulating c) natural d) unmodulated	K1	CO3
	6	The fullform PSK transmitter. a) pulse signal keying b) Phase shift keying c) Phase signal keying d) Pi shift keying	K2	CO3
4	7	Which is the characteristic of cellular telephone system? a) Accommodate a large number of users b) Large geographic area c) Limited frequency spectrum d) Large frequency spectrum	K1	CO4
	8	What is handoff? a) Forward channel b) Switching technique c) Roamer d) Guard channel	K2	CO4
5	9	Broadband networks are _____. a) Switched networks b) Packet-switched networks c) Circuit-switched networks d) Networks	K1	CO5
	10	The maximum range of Li-Fi is a) 10 m b) 50 m c) 100 m d) 200 m	K2	CO5

Cont...

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.	Identify the merits and demerits of single side banded transmission.	K3	CO1

2	(OR)		K4	CO2
	11.b.	Differentiate between DSBAM and DSBSCAM.		
	12.a.	Examine the importance of Armstrong indirect FM transmitter.		
3	(OR)		K6	CO3
	12.b.	Compare the direct FM and PM modulators.		
	13.a.	Examine why FSK transmitter is chosen in digital modulation.		
4	(OR)		K5	CO4
	13.b.	Analyse the output of pulse modulation in converting the analog information to discrete pulses.		
	14.a.	Justify the major difference in first and second generation of cellular telephone systems.		
5	(OR)		K3	CO5
	14.b.	Determine the concepts and components in cellular telephone network.		
	15.a.	Apply the concept and technology behind network.		
	15.b.	Identify the network protocols.		

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	Discuss the FET push-pull balanced modulators with the help of a circuit operation.	K6	CO1
2	17	Interpret the angle modulation with supporting derivation and figures.	K5	CO2
3	18	Evaluate the a) merits and demerits of digital transmission b) bring out the importance of pulse modulation.	K5	CO3
4	19	Discuss the concept of cellular telephone and the GSM services in detail.	K6	CO4
5	20	Explain how network technology helps in the ATM networks?	K5	CO5

Z-Z-Z

END