

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION DECEMBER 2023
(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	Electric quadropole moment is exhibited by.... (a) Spherical nuclei (b) Ellipsoidal nuclei (c) Electrical nuclei (d) None of these	K1	CO1
	2	The liquid drop model of nucleus was developed by.... (a) Bhor, Wheeler (b) Fermi (c) Rutherford (d) Chadwick	K2	CO1
2	3	Alpha particles carries.....of positive charge. (a) one unit (b) two units (c) three units (d) eight units	K1	CO2
	4	The particle emitted in beta decay together with electron... (a) Photon (b) Neutrino (c) Antineutrino (d) Meson	K2	CO2
3	5	Which one of the following particle is responsible for nuclear force? (a) Positrons (b) Mesons (c) Neutrons (d) None of the above	K1	CO3
	6	According to Yukawa's theory of nuclear forces, the origin of nuclear force between nucleons is due to the exchange of.... (a) Mesons (b) Electrons (c) Photons (d) Positrons	K2	CO3
4	7	The splitting of a nucleus into smaller nuclei is.... (a) Half life (b) Gamma radiation (c) Fusion (d) Fission	K1	CO4
	8	Name of the moderator used in the nuclear reactor? (a) Plutonium (b) Thorium (c) Graphite (d) Berilium	K2	CO4
5	9	Hyperons are particles, which are... (a) Heavier than proton (b) The same mass as proton (c) Lighter than proton (d) None of the above	K1	CO5
	10	The colours of quarks are.... (a) Red (b) Blue (c) Green (d) All the above	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.	Explain the Magnetic dipole moment and Electric quadropole moment.	K2	CO1
	(OR)			
	11.b.	Describe the predictions of shell model.		
2	12.a.	Explain Binomial distribution.	K2	CO2
	(OR)			
	12.b.	Write a short note on Geiger-Nuttal law.		
3	13.a.	Explain the general properties of nuclear force.	K3	CO3
	(OR)			
	13.b.	Describe the low energy n-p scattering.		
4	14.a.	Explain the nuclear reaction.	K2	CO4
	(OR)			
	14.b.	Explain the biological effects of radiation.		
5	15.a.	Explain the conservation laws.	K1	CO5
	(OR)			
	15.b.	Discuss in details the heavy quark effective theory.		

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 liquid drop model of the nucleus with suitable theory.	K3	CO1
2	17	Explain the beta ray spectrum and describe the Fermi's theory of beta decay.	K2	CO2
3	18	Explain the exchange force and Yukawa's theory of nuclear force.	K3	CO3
4	19	Describe the Bohr Wheeler's theory of nuclear reaction.	K4	CO4
5	20	Explain classification of elementary particle.	K1	CO5