MANIPAL
ACADEMY of HIGHER EDUCATION
(Institution of Eminence Deemed to be University)

Reg.No.										

DEPARTMENT OF SCIENCES, II SEMESTER M.Sc. (PHYSICS)
END SEMESTER EXAMINATIONS, MAY/JUNE 2023
Nuclear and Particle Physics [PHY 5254]
(CHOICE BASED CREDIT SYSTEM - 2020)

Time: 3 Hours | Date: 31/05/2023 | MAX. MARKS: 50

Note (i) Answer ALL questions
(ii) Draw diagrams, and write equations wherever necessary

Q No	Question	Marks	CO	BL
1A	What is so special about β decay spectrum? Describe how neutrino was detected.	4	01	1
1B	What is gamma decay? Discuss the two selection rules.	3	01	2
1C	Elucidate how one can estimate nuclear radius from the concept of mirror nuclei.	3	01	5
2A	Describe the terms linear energy transfer and stopping power of a medium.	3	02	2
2B	Explain secondary, auger and back-scattered electrons. What is the difference between attenuation and absorption? What are the two types of attenuation coefficients?	4	02	4
2C	Differentiate the six types of quarks. Elucidate the quark structure of meson, proton and neutron.	3	04	4
3A	Compare any two nuclear models. Discuss their limitations.	3	03	4
3B	Classify various interactions of matter with radiation. Elucidate the working of GM counter.	5	02	4
3C	Correlate magic numbers with shell model.	2	03	4
4A	Explain and derive four-factor formula. What is the four-factor formula for finite and infinite core of the reactor?	3	03	2
4B	Distinguish between fertile and fissile materials.	5	03	4
4C	Outline mass attenuation coefficient.	2	04	4
5A	Explain strangeness number. Provide an example of conservation of strangeness number.	4	04	2
5B	Illustrate Dirac's explanation of anti-particles.	3	04	3
5C	In terms of modern classification, describe salient features of leptons and mesons.	3	04	2

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