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HSSC-I NATIONAL BOOK FOUNDATION FBISE

PHYSICS TEST - CHAPTER 14: PARTICLE PHYSICS

Name:		Roll No.		Section:

Total Time: 2:30 Hour
Time Allowed: 150 Minutes

Total Marks: 150

PAPER OBJECTIVE
SECTION-A (MARKS 150)

NOTE: Section-A is compulsory. All parts of this section are to be answered on these pages and handed over to the center superintendent. Deleting / overwriting is not allowed. Do not use lead pencil.

Q.1 Fill the relevant bubble for each part. All parts carry one mark.

Questions	A	B	C	D	A B C D
1. Particle physics studies	fundamental constituents of matter	only stars	only molecules	only atoms	●○○○
2. The theory describing elementary particles and forces is the	Standard Model	Bohr model	Big Bang model	Plum pudding model	●○○○
3. Fundamental particles are those with	large size	no known internal structure	zero energy	many parts	○●○○
4. Matter particles are called	gluons	photons	fermions	bosons	○○●○
5. Force-carrying particles are called	quarks	leptons	fermions	bosons	○○○●
6. Basic groups of matter particles are quarks and	photons	gluons	leptons	bosons	○○●○
7. Number of types (flavours) of quarks is	8	6	4	3	○●○○
8. Quark flavours include up, down, charm, strange, top and	colour	left	bottom	right	○○●○
9. Charge of an up quark is	−2/3 e	−1/3 e	+2/3 e	+1/3 e	○○●○
10. Charge of a down quark is	+1/3 e	−1/3 e	+2/3 e	−2/3 e	○●○○
11. Charge of a charm quark is	+2/3 e	−1/3 e	+1 e	−1 e	●○○○
12. Charge of a strange quark is	+1/3 e	−2/3 e	+2/3 e	−1/3 e	○○○●
13. A proton is made of	two up and one down quark	two down and one up quark	three up quarks	three down quarks	●○○○
14. A neutron is made of	three up quarks	one up and one down quark	two up and one down quark	one up and two down quarks	○○○●

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Questions	A	B	C	D	A B C D
15. Total charge of a uud combination is	+2 e	+1 e	−1 e	0	○●○○
16. Total charge of a udd combination is	−1 e	0	+1 e	+2 e	○●○○
17. Quarks always occur	only in light	free and alone	only in atoms	in combinations	○○○●
18. Hadrons are particles made of	photons	leptons only	quarks	gluons	○○●○
19. Baryons consist of	a quark and antiquark	three quarks	two quarks	one quark	○●○○
20. Mesons consist of	three quarks	two leptons	a quark and an antiquark	three antiquarks	○○●○
21. Protons and neutrons are	leptons	baryons	bosons	mesons	○●○○
22. A pion is a	lepton	boson of weak force	baryon	meson	○○○●
23. Leptons include the	pion and kaon	quark and gluon	electron and neutrino	proton and neutron	○○●○
24. Number of leptons in the Standard Model is	4	6	3	12	○●○○
25. Charged leptons are electron, muon and	tau	kaon	pion	proton	●○○○
26. Charge of the electron is	−1/3 e	−1 e	0	+1 e	○●○○
27. Neutrinos have	very small mass and no charge	negative charge	positive charge	large mass	●○○○
28. Neutrinos interact	very weakly	strongly	by charge only	by gravity only	●○○○
29. Muon is similar to electron but	neutral	stable	heavier	lighter	○○●○
30. Leptons do not feel the	gravity	strong force	weak force	electromagnetic force for charged leptons	○●○○
31. Antiparticle of an electron is a	positron	proton	muon	photon	●○○○

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Questions	A	B	C	D	A B C D
32. A positron has	positive charge, same mass as electron	negative charge	no charge	large mass	●○○○
33. Antiparticle of a proton is	positron	neutron	electron	antiproton	○○○●
34. Antimatter was predicted by	Rutherford	Bohr	Dirac	Thomson	○○●○
35. Positron was discovered by	Anderson	Millikan	Dirac	Chadwick	●○○○
36. When a particle meets its antiparticle they	combine permanently	form a nucleus	repel	annihilate into energy	○○○●
37. Electron-positron annihilation produces	one electron	a neutron	two protons	two gamma photons	○○○●
38. Minimum energy for pair production of electron-positron is	0.511 MeV	0.1 MeV	1.02 MeV	938 MeV	○○●○
39. Pair production converts	mass into energy	energy into mass	charge into mass	mass into charge	○●○○
40. PET scans use	positron annihilation	X-ray diffraction	radio waves	sound waves	●○○○
41. Number of fundamental forces is	4	2	3	5	●○○○
42. The four fundamental forces are gravity, electromagnetic, strong and	magnetic	weak	nuclear	friction	○●○○
43. Strongest of the four forces is the	weak force	strong force	electromagnetic force	gravity	○●○○
44. Weakest of the four forces is	strong force	weak force	gravity	electromagnetic force	○○●○
45. Gravity has infinite	charge	mass	range	strength	○○●○
46. Strong force holds together	atoms in molecules	planets in orbit	electrons in orbit	quarks in nucleons	○○○●
47. Strong force has range of about	10^{-10} m	10^{-5} m	10^{-15} m	infinite	○○●○
48. Weak force is responsible for	planetary orbits	beta decay	friction	magnetism	○●○○

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Questions	A	B	C	D	A B C D
49. Electromagnetic force acts between	charged particles	neutral particles only	mass only	neutrinos only	●○○○
50. Carrier of the electromagnetic force is the	photon	W boson	gluon	graviton	●○○○
51. Carrier of the strong force is the	Z boson	gluon	photon	Higgs	○●○○
52. Carriers of the weak force are	gluons	photons	W and Z bosons	gravitons	○○●○
53. Hypothetical carrier of gravity is the	graviton	gluon	photon	Higgs boson	●○○○
54. W^+ boson carries charge	−1 e	0	+1 e	+2 e	○○●○
55. Z boson is	stable	negative	positive	electrically neutral	○○○●
56. Photon has	zero rest mass	positive charge	large mass	negative charge	●○○○
57. Gluons bind	planets	atoms	electrons to nuclei	quarks together	○○○●
58. Colour charge is related to the	weak force	strong force	magnetic force	gravity	○●○○
59. Three colour charges of quarks are	red, green, blue	cyan, magenta, yellow	up, down, strange	black, white, grey	●○○○
60. Quark confinement means quarks cannot be	detected in protons	isolated	accelerated	combined	○●○○
61. Higgs boson was discovered at	CERN	KEK	Fermilab	Brookhaven	●○○○
62. Higgs boson was discovered in the year	2000	1995	2012	2020	○○●○
63. Higgs field gives particles	colour	spin	mass	charge	○○●○
64. LHC stands for	Large Heavy Collider	Linear Hadron Collider	Large Hadron Collider	Light Hadron Cyclotron	○○●○
65. LHC is located near	London	Berlin	Paris	Geneva	○○○●

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Questions	A	B	C	D	A B C D
66. LHC accelerates	neutrons only	neutrinos	protons	photons	○○●○
67. LHC circumference is about	27 km	270 km	2.7 km	270 m	●○○○
68. CERN stands for	European Organization for Nuclear Research	Centre for Nuclear Science	Centre for Energy Research	Council of Energy	●○○○
69. Particle accelerators use	gravity	electric and magnetic fields	sound waves	heat	○●○○
70. Electric fields in accelerators	speed up particles	bend particles	stop particles only	detect particles	●○○○
71. Magnetic fields in accelerators	bend particles in curved paths	speed up particles	heat particles	stop particles	●○○○
72. A cyclotron accelerates particles along a	straight line	square path	random path	spiral path	○○○●
73. A linear accelerator accelerates particles along a	straight line	spiral	circle	ellipse	●○○○
74. Synchrotron keeps particles in a	fixed circular path	straight line	random path	spiral	●○○○
75. Particle detectors record	only neutrons	sound	heat only	tracks of charged particles	○○○●
76. A cloud chamber shows tracks of	neutrons only	charged particles	photons only	neutral particles	○●○○
77. A bubble chamber uses a	magnet only	superheated liquid	gas under vacuum	solid crystal	○●○○
78. Charged particle track curves in a	no field	sound	magnetic field	gravity only	○○●○
79. Direction of track curvature shows the particle's	spin only	mass only	colour	sign of charge	○○○●
80. Radius of curvature in a magnetic field gives particle's	momentum	colour	lifetime	spin	●○○○
81. Neutral particles leave	spiral tracks	curved tracks	no track	thick tracks	○○●○
82. Feynman diagrams represent	atoms	particle interactions	molecules	orbits	○●○○

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Questions	A	B	C	D	A B C D
83. In a Feynman diagram, time usually runs	left to right	in circles	top to bottom randomly	not at all	●○○○
84. Wavy lines in Feynman diagrams usually represent	neutrons	bosons	fermions	quarks	○●○○
85. Straight lines with arrows in Feynman diagrams represent	bosons	gluons	photons	fermions	○○○●
86. Beta minus decay emits an	electron and antineutrino	alpha particle	neutron	positron and neutrino	●○○○
87. Beta plus decay emits a	electron and antineutrino	alpha particle	photon	positron and neutrino	○○○●
88. In beta minus decay a neutron changes into a	proton	electron only	neutron	photon	●○○○
89. In beta minus decay a down quark changes into an	strange quark	charm quark	top quark	up quark	○○○●
90. In beta plus decay a proton changes into a	quark pair	photon	electron	neutron	○○○●
91. Neutrino was proposed by	Dirac	Fermi	Thomson	Pauli	○○○●
92. Neutrino was proposed to explain	X-rays	energy missing in beta decay	alpha decay	gamma emission	○●○○
93. Conserved quantities in particle interactions include	charge	position	colour of paint	speed	●○○○
94. Baryon number of a proton is	+1/3	+1	0	−1	○●○○
95. Baryon number of an electron is	+1/3	+1	0	−1	○○●○
96. Baryon number of a quark is	+1	0	−1	+1/3	○○○●
97. Baryon number of an antiproton is	+1	+3	0	−1	○○○●
98. Lepton number of an electron is	+1	0	−1	+1/3	●○○○
99. Lepton number of a positron is	+2	0	+1	−1	○○○●

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Questions	A	B	C	D	A B C D
100. Lepton number of a proton is	−1	+1	+3	0	○○○●
101. In beta minus decay, total lepton number is	conserved	zero always	doubled	not conserved	●○○○
102. Neutron decays into proton, electron and	positron	antineutrino	neutrino	photon	○●○○
103. The total charge in any interaction is	destroyed	changed	doubled	conserved	○○○●
104. Spin of fermions is	infinite	half-integer	integer	zero	○●○○
105. Spin of bosons is	negative	half-integer	zero only	integer	○○○●
106. Matter mostly consists of	muons	up quarks, down quarks and electrons	strange quarks	tau particles	○●○○
107. Atoms are made of	only electrons	protons, neutrons and electrons	only neutrons	only protons	○●○○
108. Electrons are bound to the nucleus by	weak force	gravity only	strong force	electromagnetic force	○○○●
109. Nucleons are bound in the nucleus by	weak force	electromagnetic force	strong force	gravity	○○●○
110. Antimatter has the	opposite charge of normal matter	same charge	negative mass	no mass	●○○○
111. Total number of quarks in a pion is	3	2	6	1	○●○○
112. Total number of quarks in a baryon is	3	6	1	2	●○○○
113. Combination of an up quark and an anti-down quark forms a	proton	pion	electron	neutron	○●○○
114. Charge of a π^+ meson is	+2 e	0	+1 e	−1 e	○○●○
115. Antiquarks have charges	whole numbers	opposite to quarks	same as quarks	zero	○●○○
116. Top quark is the	lightest quark	stable quark	neutral quark	heaviest quark	○○○●

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Questions	A	B	C	D	A B C D
117. Up and down quarks are	neutral quarks	bosons	heaviest quarks	lightest quarks	○○○●
118. Exotic particles produced in cosmic ray showers include	only protons	only atoms	only electrons	muons and pions	○○○●
119. Cosmic rays are	sound waves	visible light	high-energy particles from space	radio waves	○○●○
120. Big Bang theory describes the	origin of life	origin of metals	origin of the universe	origin of oceans	○○●○
121. Early universe was dominated by	planets	hot dense particles	stars	cold gas	○●○○
122. Dark matter does not interact	gravitationally	with mass	with light	with galaxies	○○●○
123. Dark matter is known mainly from its	gravitational effects	radio emission	heat emission	light emission	●○○○
124. Dark energy is believed to cause	planetary orbits	stellar fusion	accelerated expansion of the universe	contraction of the universe	○○●○
125. Antimatter-matter imbalance in the universe is	trivial	an unsolved problem	non-existent	fully solved	○●○○
126. Energy released when a proton and antiproton annihilate is about	0.511 MeV	938 MeV	1 eV	1.88 GeV	○○○●
127. Mass-energy relation used in annihilation is	$E = mv^2$	$E = mc$	$E = m/c$	$E = mc^2$	○○○●
128. One GeV equals	10^9 eV	10^6 eV	10^{12} eV	10^3 eV	●○○○
129. One MeV equals	10^9 eV	10^3 eV	10^6 eV	10^{12} eV	○○●○
130. One TeV equals	10^9 eV	10^{15} eV	10^{12} eV	10^6 eV	○○●○
131. Electron volt is a unit of	force	mass	charge	energy	○○○●
132. Mass of a particle is often expressed in	$MeV \cdot c^2$	MeV/c^2	MeV	MeV/c	○●○○
133. The electron mass is about	105 MeV/c^2	938 MeV/c^2	0.511 MeV/c^2	1777 MeV/c^2	○○●○

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Questions	A	B	C	D	A B C D
134. Proton mass is about	938 MeV/c²	105 MeV/c²	135 MeV/c²	0.511 MeV/c²	●○○○
135. Muon mass is about	938 MeV/c²	1777 MeV/c²	105.7 MeV/c²	0.511 MeV/c²	○○●○
136. Higher-energy collisions can create	lighter particles only	heavier particles	only photons	no particles	○●○○
137. Collision of high-energy protons in LHC mimics conditions just after the	formation of Earth	first stars	Big Bang	ice age	○○●○
138. Fermions obey Pauli's	uncertainty principle	exclusion principle	equivalence principle	inertia	○●○○
139. Photon is the quantum of	strong force	weak force	gravity	electromagnetic radiation	○○○●
140. Electron is a	baryon	quark	boson	lepton	○○○●
141. Gluon is a	boson	baryon	meson	lepton	●○○○
142. Proton is a	meson	lepton	baryon	boson	○○●○
143. Neutrino is a	quark	meson	lepton	baryon	○○●○
144. Quarks have charges that are	whole multiples of e only	larger than e	fractions of e	zero	○○●○
145. Number of generations of matter particles in Standard Model is	6	4	2	3	○○○●
146. Tau lepton is the	quark	heaviest charged lepton	lightest lepton	neutral lepton	○●○○
147. Particle that gives mass through a field is the	photon	neutrino	gluon	Higgs boson	○○○●
148. Neutral particles cannot be accelerated by	electric fields	collisions	heat	gravity	●○○○
149. Strong force between nucleons is	zero	long-range only	short-range and attractive	long-range and repulsive	○○●○
150. Particle with charge +1 e and baryon number +1 is the	electron	proton	neutron	positron	○●○○

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