

C: REGISTRATION NUMBER: _____

M.Sc Physics Admission Test

Department of Physics
Quaid-i-Azam University
Islamabad.

3 September 2007

Time: 60 minutes

- Answer all 10 questions or as many as you can.
- Each question carries equal marks. Circle only the right answer. If you do not know the answer, do not circle any answer.
- Circling two choices will be considered as a wrong answer.
- Wrong answers will be negatively marked. Your total marks will be reduced if you circle the wrong answer.
- If you circle the wrong box, write “cancel” to cancel it.
- Do not attempt to copy. Your neighbor may have a different ordering of questions and answers.
- Any attempt to copy answers from another candidate will result in permanent disbarment from the university for all purposes.
- No books or calculators are allowed.
- GIVE ALL ANSWERS ON THIS SHEET ONLY. The remaining sheets are not to be submitted – you may take them with you.

CIRCLE THE CORRECT ANSWER

Q.1	a	b	c	d	e
Q.2	a	b	c	d	e
Q.3	a	b	c	d	e
Q.4	a	b	c	d	e
Q.5	a	b	c	d	e
Q.6	a	<input type="checkbox"/> b	c	d	e
Q.7	a	b	c	d	e
Q.8	a	b	c	d	e
Q.9	a	b	c	d	e
Q.10	a	b	c	d	e

Q.1 A particle of charge q and mass m enters with speed v into a uniform magnetic field B that is perpendicular to the velocity. An electric field is applied in a direction perpendicular to B with a strength E just sufficient to keep the particle from bending. (In the units used below c is the speed of light and the electric and magnetic fields have the same units). The electric field is:

a) $E = \frac{1}{2}mv^2B$

b) $E = \frac{vB}{mc}$

c) $E = \frac{1}{2} \frac{vB}{c}$

d) $E = \frac{vB}{c}$

e) The electric field cannot prevent the particle from bending.

Q.2 A deep underwater explosion causes waves to spread out from point P . The amplitude of the waves decreases as a function of distance r from P as,

a) $\frac{1}{r^2}$

b) $\frac{1}{r}$

c) $\frac{1}{r^{1/2}}$

d) $\frac{1}{\log r}$

e) $\log r$

Q.3 Consider three ideal gases all at temperature T . A has N single atoms, B has $N/2$ diatomic molecules, and C has $N/3$ triatomic molecules. Which is the WRONG statement below?

- a) The ratio of pressures is 6 : 3 : 2
- b) At sufficiently high temperature, the specific heats at constant volume for all gases are equal.
- c) At sufficiently high temperature, the specific heats at constant pressure for all gases are equal.
- d) The internal energy of all three gases is equal at high enough temperature.
- e) All three gases have the same entropy at all temperatures.

Q.4 The approximate number of molecules in a grain of salt of size 1mm^3 is closest to,

- a) 10^{15}
- b) 10^{17}
- c) 10^{21}
- d) 10^{27}
- e) 10^{33}

Q.5 A mass m is tied to one end of a string of length L and whirled around in a vertical circle.

What is the minimum kinetic energy that the mass must have at any point on the circle?

- a) zero
- b) $\frac{1}{2}mgL$
- c) mgL
- d) $\frac{3}{2}mgL$
- e) Cannot be determined from given information.

Q.6 A cube of volume V and constant density ρ is placed on a smooth level surface and pushed with a pressure P from one side. Find the acceleration of the cube.

- a) $\frac{PV^{1/3}}{\rho}$
- b) $\frac{P}{V^{1/3}\rho}$
- c) $\frac{PV^{1/3}}{\rho}$
- d) $\frac{PV}{\rho}$
- e) none of the above

Q.7 A bucket almost filled with water is hung with a rope and rotated. The water level is higher at the rim than at the centre. A small speck of dust floats mid-way between the centre and the rim. The reason it does not slip down the inclined plane of water is most accurately summarized by one of the following statements:

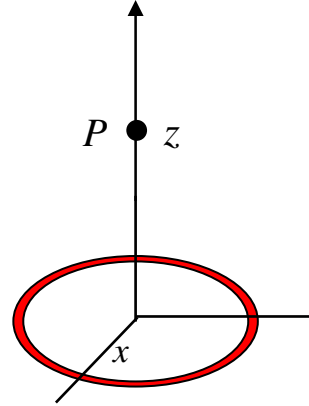
- a) Centrifugal force pushes the speck outwards.
- b) Gravity is not strong enough to make the speck slip down.
- c) Centrifugal force and gravity compensate each other.
- d) The force on the speck normal to the liquid surface compensates the effect of gravity and the centrifugal force.
- e) The speck is so small and light that all forces acting upon it are small. So it remains at rest.

Q.8 Two concentric rings, each with equal mass per unit length λ , are joined so that they rotate together through the centre. One ring has radius R , the other $2R$. The moment of inertia of the combined system is,

- a) $\pi\lambda R^2$
- b) $2\pi\lambda R^3$
- c) $8\pi\lambda R^3$
- d) $18\pi\lambda R^3$
- e) None of the above

Q.9 A ring-shaped conductor of radius R carries a total charge q . Point P is along the line perpendicular to the plane of the ring at distance z away from the centre with $z \gg R$. The electric field is proportional to:

- a) $\frac{q}{z}$
- b) $\frac{qz}{R^2}$
- c) $\frac{q}{z^2}$
- d) $\frac{q}{z^2} \log \frac{z}{R}$
- e) $q \log \frac{z}{R}$



Q.10 A particle moves in the x direction according to $x = \frac{1}{2}vt + A \sin \omega t$ and in the y direction

according to $y = \frac{1}{2}vt + A \cos \omega t$. The path seen is,

- a) A simple oscillation in the x and y directions.
- b) A circular path with the origin moving at speed v .
- c) A circular path with the origin at rest.
- d) An ellipsoidal path.
- e) A circular path with the origin moving at speed $v/\sqrt{2}$.

Q.1				d	
Q.2		b			
Q.3					e
Q.4			c		
Q.5		b			
Q.6		b			
Q.7				d	
Q.8				d	
Q.9			c		
Q.10		□			e