SAINT JOSEPH'S PREPARATORY SCHOOL
PHYSICS TEST QUESTIONS.....T P FITZPATRICK
Final Exam Review Questions

Static Electricity

1. Who was the first person to assert that there are exactly two kinds of electric charge?
2. What determines which becomes positive and which becomes negative when two materials are rubbed together?
3. When fur is rubbed on amber, the amber becomes negatively charged. How does this happen?
4. Explain why charged objects can attract neutral objects but not repel them.
5. Why do the leaves of an electroscope always repel each other no matter what kind of charge is placed on the electroscope?
6. What is the equation that defines Coulomb's Law?
7. Electrical forces are, in general, much larger than gravitational forces. Why is it then, that gravity seems to be the driving force in the universe?
8. What English word comes from the Greek word for amber?
9. What name is given to the quantity that describes the force that a positive test charge would experience if it were to be placed at a point?
10. What is the difference between electrical potential energy and electrical potential?
11. What is the unit for electrical potential?
12. In terms of conservative and non-conservative, what are electrical forces?
13. What defines the direction of an electric field?
14. There are two correct units for electric field. What are they?
15. What arbitrary definition made by a famous Philadelphian resulted in electrons being negatively charged?

Capacitance and Capacitive Circuits

16. What is the structural definition of a capacitor?
17. What is the functional definition of a capacitor?
18. How does the voltage between one plate of a capacitor and a point midway between the plates compare to the voltage between the two plates?
19. If two conductors have a constant potential difference between them, what happens to the electric field between them if the distance between them is doubled?
20. What does "breakdown field strength" mean?
21. How is the energy stored on a capacitor at any point in time related to the current through it at that time?
22. When a capacitor is charged through a resistor by a constant voltage source, the current through the circuit decreases exponentially. Why?
23. When an uncharged capacitor is connected in series with a resistor in a circuit with a voltage source, the voltage across the capacitor will be zero initially and increase over time. What will the voltage across the capacitor be when it stops rising?
24. When an uncharged capacitor is connected in series with a resistor in a circuit with a voltage source, the voltage across the capacitor will be zero initially and increase over time. What will the current in the circuit be when the voltage across the capacitor is the same as the supply voltage?

Sound

1. Sound consists of what kind of mechanical waves? (transverse or longitudinal or …)
2. What is considered the lowest frequency that human ears can detect?

3. What is considered the highest frequency that human ears can detect?
4. What remains constant in the inner ear as it varies outside the ear drum when sound enters the ear?
5. What characteristic of sound waves is interpreted as pitch?
6. What characteristic of sound waves is interpreted as loudness?
7. Why is the decibel scale used to measure sound intensity?
8. Because of interference, when two almost identical sound waves are present at the same time, varying loud and soft sound is heard. What is the phenomenon called?
9. What name is given to the lowest frequency with which a sound producing object vibrates?
10. What name is given to the whole number multiples of the lowest frequency of a vibrating string?
11. When a string that is fixed at both ends vibrates at its lowest frequency, how is the wavelength of the sound related to the length of the string?
12. When a tube (like an organ pipe or other hollow tube) that is closed at one end and open at the other vibrates at its lowest frequency, how is the length of the tube related to the wavelength of the sound?
13. When a tube (like an organ pipe or other hollow tube) that is open at both ends vibrates at its lowest frequency, how is the length of the tube related to the wavelength of the sound?
14. Identify each term in this equation: $$d\text{B} = 10\log\left(\frac{I}{I_0}\right)$$
15. What does I/I_0 represent in this equation: $$d\text{B} = 10\log\left(\frac{I}{I_0}\right)$$
16. What does dB represent in this equation? $$d\text{B} = 10\log\left(\frac{I}{I_0}\right)$$
17. What does I_0 represent in this equation? $$d\text{B} = 10\log\left(\frac{I}{I_0}\right)$$
18. What are the units for I_0?
19. What is the Doppler Effect?
20. What is the significance of the $\pm$ and $\mp$ symbols in this equation? $$f' = f\left(\frac{v \pm v_O}{v \mp v_S}\right)$$
21. What is f' in this equation? $$f' = f\left(\frac{v \pm v_O}{v \mp v_S}\right)$$
22. What is f in this equation? $$f' = f\left(\frac{v \pm v_O}{v \mp v_S}\right)$$
23. What is v in this equation? $$f' = f\left(\frac{v \pm v_O}{v \mp v_S}\right)$$
24. What is v_o in this equation? $$f' = f\left(\frac{v \pm v_O}{v \mp v_S}\right)$$
25. What is v_s in this equation? $$f' = f\left(\frac{v \pm v_O}{v \mp v_S}\right)$$
26. Why is the sound from the music box mechanism louder when held against the desk or the door than it is when just held in the air?
27. What two things determine the speed of a wave through a medium?

28. The speed of sound in air at 0.0 °C is 331 m/s. What is the formula used to correct this value for temperature?
29. The energy content of a wave is directly proportional to the square of the wave's amplitude and to what else?
30. What kind of wave is present when the motion of the particles in the medium is parallel to the motion of the wave?
31. What term or phrase is used to describe the fact that a vibrating tuning fork mounted in a wooden box causes the box to vibrate at the tuning fork's frequency?
32. When a standing wave exists in a medium, certain points in the medium move more than any of the others. What are these points called?
33. How is the wavelength of a string's fundamental frequency related to the length of the string?
34. What is the name of the phenomenon that occurs when the observed frequency of a sound is changed by the motion of either the source or the observer?
35. When two things vibrate at nearly the same frequency, beats occur. How is the beat frequency calculated?
36. What kind of wave is present when the motion of the particles in the medium is perpendicular to the motion of the wave?
37. What formula is used to calculate the speed of a transverse wave along a string from the tension in the string and its mass density?
38. What two characteristics of a stretched string determine the speed of transverse waves along it?
39. What effect does increasing the tension in a string have on the speed of transverse waves along it?
40. What term or phrase is used to describe the fact that a vibrating tuning fork mounted in a wooden box causes another identical tuning fork also mounted in a wooden box to vibrate even when the two are not touching?
41. When a standing wave exists in a medium, certain points in the medium move very little. Under ideal conditions they do not move at all. What are these points called?

The energy content of a wave is directly proportional to the square of the wave's frequency and to the square of what else?

SHM

42. Which two of the following physical characteristics determine the period of oscillation of an object undergoing simple harmonic motion: mass, amplitude, spring constant, distance from equilibrium, kinetic energy, potential energy?
43. What kind of wave form describes simple harmonic motion?
44. If $A\omega$ is the maximum velocity of an object moving with Simple Harmonic Motion, what is the expression for the maximum acceleration of the same object?
45. If $A\omega$ is the maximum velocity of an object moving with Simple Harmonic Motion, what is the expression for the maximum displacement from equilibrium of the same object?
46. What is simple harmonic motion a projection of?
47. What is the formula for calculating the period of simple harmonic motion for a weight suspended on a spring?
48. What must be directly proportional to displacement from equilibrium in order for simple harmonic motion to occur?
49. What is the definition of amplitude?

50. What is the formula for calculating the period of a pendulum?
51. Why is a pendulum not exactly simple harmonic motion?
52. A wave in which the motion of the medium is perpendicular to the motion of the wave is called what?
53. How are period and frequency related?
54. What two other characteristics of a wave determine its wavelength? State the formula that relates the three quantities.
55. The energy content of a wave is proportional to the square of what two properties of the wave?
56. When two waves travel through the same medium simultaneously, the actual position of each particle of the medium is the vector sum of the positions that would result from each wave. What is the name given to this principal?
57. As two or more waves pass through each other in a medium, sometimes their effects combine to produce a greater result. What is this called?
58. As two or more waves pass through each other in a medium, sometimes their effects cancel out. What is this called?
59. A wave in which the motion of the medium is parallel to the motion of the disturbance is called what?
60. Describe a standing wave.
61. What wave actions produce standing waves?
62. What is the name given to the phenomenon that occurs when wave energy is easily transferred from one object to another because they tend to vibrate at the same frequency?
63. When longitudinal waves pass through a medium, what are the names given to the parts of the waves that generally correspond to the crests and troughs?
64. What is a node?
65. What is an anti-node?
66. Under what circumstances is it appropriate to consider a pendulum to be undergoing simple harmonic motion?
67. When longitudinal waves pass through a medium, there are areas of compression and rarefaction associated with the waves. What are the corresponding parts of a transverse wave?
68. When transverse waves pass through a medium, there are crests and troughs associated with the waves. What are the corresponding parts of a longitudinal wave?

Light

69. Give at least two examples of light being converted to another form of energy or work.
70. How can a red and a green filter be used to demonstrate that white light contains both red and green components?
71. What is “selective transmission” and how can it be demonstrated using two different colored filters?
72. What determines the color of an opaque object? If an American flag is illuminated with blue light, what color would its red, white and blue parts appear to be?
73. List at least four different types of electromagnetic radiation in order of increasing frequency and state one use or property of each. Include visible light in the list.
74. When is the behavior of light most easily described as a wave? When is the behavior of light most easily described as a particle?
75. What is a photon? How does it differ from the particles described by Newton?
76. In which of these situations does light show its photon nature and in which does it show its wave nature: light passing through a narrow slit; light falling on a metal and ejecting electrons from it (the photoelectric effect); light emitted by the atoms in a neon lamp; light passing through a polarizer.
77. What characteristics of light are evidence of its particle nature?
78. What characteristics of light are evidence of its wave nature?
79. When does light exhibit characteristics most like a particle?
80. When does light exhibit characteristics most like a wave?

81. Then energy content of a photon is directly proportional to
82. When is the speed of light c?
83. When is an object luminous?
84. Why is a piece of wood is visible?
85. What three colors of light stimulate the eye's cones the most?
86. Which color of photons has the most energy?
87. In the photoelectric effect, what will increase the number of electrons that are emitted?
88. In order for the photoelectric effect to occur, what characteristic of a photon must be at or above a certain 'threshold' level?
89. What does a florescent material do?
90. When a ray of light is reflected from a mirrored surface, the angle of reflection is equal to the angle of incidence. From what line are both of these angles measured?
91. What is the formula for calculating the 'magnification' of a spherical mirror?
92. Why is a parabolic mirror better than a spherical mirror?
93. What is the magnification of a plane mirror?
94. What kind(s) of image(s) of real objects can be formed by a concave mirror?
95. What kind(s) of image(s) of real objects can be formed by a convex mirror?
96. What is the mirror equation?
97. In a spherical mirror, how is the focal length related to the radius of curvature?
98. Define a "real" image.
99. Define a "virtual" image.
100. What is the defining characteristic of the focal length for a convex mirror?
101. What is the significance of a negative magnification?
102. What is the significance of a magnification that is between -1 and +1?
103. Other than the focal length of a spherical (or parabolic) mirror, what determines the magnification?
104. Which color light has the higher energy per photon: red or violet?
105. Which color light has the longer wavelength: red or violet?
106. What color do we see when the red and green cone cells in a small area on the retina are stimulated about the same amount?

Circuits

107. In a simple series circuit, what quantity is the same throughout?
108. In a simple parallel circuit, what quantity is the same throughout?
109. In a simple parallel circuit, what quantity can be different in each resistor?
110. In a simple series circuit, what quantity can be different in each resistor?
111. What are the three formulas for calculating the power dissipated by a resistor?
112. State Kirchoff's Law for voltage.
113. State Kirchoff's Law for current.
114. How is the direction of the current related to the voltage across a device that is adding electrical energy to a circuit?
115. How is the direction of current related to the electrical potential across a device that is removing electrical energy from a circuit?
116. What is the name of the device that stores energy in an electric Field?
117. What is the name of the device that converts electrical energy to heat?

118. What is the name of the device that is made of two conductors separated by a non-conductor?
119. What is the name of the device that converts chemical energy to electrical energy?
120. Which of the following prepositions is usually used when describing voltage?
121. Which of the following prepositions is usually used when describing current?
122. What quantity is measured in ohms?
123. What quantity is measured in farads?
124. How is the voltage related to current in regards to capacitors.
125. How is the voltage related to current in regards to resistors?
126. Which quantity is the same for all devices connected in parallel?
127. Which quantity is the same for all devices connected in series?
128. What effect does doubling the voltage have on the charge on a capacitor?
129. What effect does doubling the voltage have on the energy in a capacitor?
130. What effect does doubling the voltage have on the current associated with a capacitor?
131. What effect does doubling the voltage have on the current associated with a resistor?
132. What effect does doubling the voltage have on the current associated with a resistor?
133. What effect does doubling the voltage have on the rate at which a resistor generates heat?
134. What effect does adding another resistor to a series circuit have on the equivalent resistance of the circuit?
135. What effect does adding another resistor to a parallel circuit have on the equivalent resistance of the circuit?
136. What effect does reducing the "load" resistor in a simple circuit have on the heat generated by the internal resistance?
137. What effect does reducing the "load" resistance in a simple circuit have on the terminal voltage of the cell or battery?
138. What effect does doubling the voltage have on the energy stored in a capacitor?
139. What is Ohm's Law?
140. In a simple series circuit, what quantity is the same throughout?
141. In a simple parallel circuit, what quantity is the same throughout?
142. In a simple parallel circuit, what quantity can be different in each resistor?
143. In a simple series circuit, what quantity can be different in each resistor?
144. What are the three formulas for calculating the power dissipated by a resistor?
145. State Kirchoff's Law for voltage.
146. State Kirchoff's Law for current.
147. How is the direction of the current related to the voltage across a device that is adding electrical energy to a circuit?
148. How is the direction of current related to the electrical potential across a device that is removing electrical energy from a circuit?
149. Give the formula for calculating the energy stored on a capacitor from the voltage across it and the charge on it.
150. Give the formula for calculating the energy stored on a capacitor from its capacitance and the voltage across it.
151. Give the formula for calculating the energy stored on a capacitor from the charge on it and its capacitance.
152. What effect does doubling the voltage across a capacitor have on the charge that it contains?
153. What name is given to the property of a device that converts electrical energy to heat?
154. What units are obtained when resistance is multiplied by capacitance?
155. What characteristic of a device is measured in Farads?
156. Write the equation describing Ohm's Law.
157. State Kirchoff's Law for voltage.

158. What letter other than V is used to represent a voltage supply or source?
159. What quantity in a series circuit is the same everywhere?
160. When current flows "through" a capacitor, what builds up or is reduced in the capacitor that results in a change in the voltage across the capacitor?
161. How can the equivalent resistance of a series circuit be calculated if all of the individual resistances are known?
162. What is the formula for calculating power extracted by any device in all electrical circuits?
163. What is the effect of a device on a circuit whenever the current through it is moving from a relatively low potential to a relatively high potential?
164. What is the relationship between the direction of the current through a device and the voltage across the device whenever the device is removing electrical energy from a circuit?
165. A particular resistor has a four stripe color code. What is the meaning of the third stripe?
166. What property of a device is measured in ohms?
167. What is the effect on capacitance of increasing the size of the plates?
168. What is the effect on capacitance of increasing the distance between the plates?
169. In the definition of a wire, what is assumed to be the same at every point along the wire?
170. A battery or power supply is supposed to keep a particular electrical quantity constant. What is the name of this quantity?
171. In terms of a capacitor, what is a dielectric?
172. What effect does tripling the dielectric constant have on capacitance?
173. What is Coulomb's Law?
174. There are two different but equivalent units for electric field. What are they?
175. What is meant by the term "breakdown field strength"?
176. What is the structural definition of a capacitor?
177. What is the functional definition of a resistor?
178. What is the functional definition of a capacitor?
179. What is the difference between the terms "electrical potential energy" and "electrical potential"?
180. What are the units for electrical potential difference?
181. How is the voltage across a capacitor related to the charge stored on it?
182. What are the units for electric current?
183. What does an electrochemical cell (battery) do?
184. What effect does tripling the voltage across a resistor have on the current passing through it?
185. What effect does tripling the voltage across a resistor have on its resistance? Assume that the higher voltage does not damage the resistor.
186. What kind of device converts electrical energy to heat?
187. What kind of device stores energy in an electric field?
188. What kind of capacitor uses chemicals to store some of the energy?
189. The power supplies in the lab have the positive and negative connections identified by color. What is the color of the positive connection?
190. The power supplies in the lab have the positive and negative connections identified by color. What is the color of the negative connection?
191. How is the rate at which heat is generated by a resistor calculated from the voltage across it and its resistance?

192. How is the rate at which heat is generated by a wire calculated from the current running through it and its resistance?
193. What effect does doubling the voltage across a resistor have on the heat that it generates?
194. What is the assumed resistance of a wire?

Magnetism

195. What is the formula for determining the magnitude of the force experienced by a charge moving through a magnetic field?
196. Explain the right hand rule for determining the direction of the force experienced by a charge moving through a magnetic field.
197. What is the formula for calculating the magnitude of the force exerted on a current carrying wire when in a magnetic field?
198. Explain the right hand rule for determining the direction of the force exerted on a current carrying wire when in a magnetic field.
199. A horizontal wire is moved vertically downward through a magnetic field. If the wire extends from right to left and the magnetic field is directed toward the observer, which end of the wire will be positive as a result of the induced emf?
200. What is the magnetic polarity of the earth's magnetic pole found in Canada?
201. Explain the right hand rule for determining the direction of the magnetic field induced around a current carrying wire.
202. What is the primary use of a transformer? What kind of current is necessary for a transformer to function?
203. Transformers are used to change alternating current voltages. How is the output voltage of a transformer determined?
204. What is the reason for stepping the voltage up to 400,000 volts when transmitting power from a power plant to a city?
205. How are transformers constructed?
206. How is the current output of a transformer related to the current input and the "turn ratio"?
207. A microscopic magnetic region composed of a group of atoms whose magnetic fields are aligned in a common direction is called a(n) ____. In most materials, when these groups are randomly distributed, the substance will show ____ magnetism.
208. Which of the following statements about Earth's magnetic field is true?
209. A solenoid is in an upright position on a table. A clockwise current—when viewed from above—causes the solenoid to have a ____ magnetic pole at its bottom end. If a compass is placed at the top of the solenoid, the north pole of the compass would be ____.
210. Which of the following situations is not true for magnets?
211. The lines of the magnetic field around a current-carrying wire
212. If you break a bar magnet in half, each half
213. Where is the magnitude of the magnetic field around a permanent magnet greatest?
214. The source of all magnetic force is:
215. Draw a bar magnet and the magnetic field lines around it.
216. Magnetic field lines surrounding a magnet are Consider two long, straight, parallel wires, each carrying a current I. If the currents move in the same direction,
217. What is the path of an electron moving perpendicular to a uniform magnetic field?
218. All of the following statements about magnetic field lines around a permanent magnet are true except which one?
219. Which pole of a compass needle points to a south pole of a magnet?