UNIVERSITY OF IBADAN, IBADAN

Post UTME Past Questions and Answers

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POST-UTME PRACTICE QUESTIONS & ANSWERS

PHYSICS

1. A ball is thrown up into the air. At the highest point of its trajectory the ball: (A) Is accelerating downwards (B) has zero acceleration (C) is accelerating upwards (D) is still moving upwards   **B**

2. A ball of mass 200 g moving with a velocity of 8 m/s collides and sticks with another ball of mass 300 g moving in the same direction with velocity 4 m/s. What is the common velocity of the balls after the collision? (A) 5.6 ms^{-1} (B) 2.8 ms^{-1} (C) 11.2 ms^{-1} (D) 1.4 ms^{-1} **A**

3. A boy holds the end of a rubber cord from which hangs a solid metal ball, if the boy whirls the ball in a horizontal circle, keeping his hand still. If the rubber cord breaks when the ball is at a point on the circle, in what direction will the ball move? (A) towards the hand of the boy B. away from the hand of the boy C. in the direction of the tangent to the circle at the point of break D. None of the above   **C**

4. A force of 20 N applied parallel to the surface of horizontal table is just sufficient to make a block of mass 4 kg set for motion. Find the acceleration when the force is doubled. (A) 2 ms^{-2} (B) 4 ms^{-2} (C) 5 ms^{-2} (D) 10 ms^{-2} **C**

5. A man walks 1 km due east and then 1 km due north. His displacement is (A) 1 km N15°E (B) 1 km N30°E (C) √2 km N45°E (D) 2 km N75°E   **C**

6. A motor car moves with a velocity of 20 ms^{-1} on a rough horizontal road and covers a displacement of 50 m. Find the coefficient of dynamic friction between the type and the ground (g = 10 ms^{-2}) (A) 0.3 (B) 0.6 (C) 0.5 (D) 0.4   **D**

7. A physics student standing on the edge of a cliff throws a stone vertically *downward* with an initial speed of 10.0 m/s. The instant before the stone hits the ground below, it is traveling at a speed of 30.0 m/s. If the physics student were to throw the rock *horizontally outward* from the cliff instead, with the same initial speed of 10.0 m/s, what is the magnitude of the velocity of the stone just before it hits the ground?
(A)   10.0 m/s   (B)   20.0 m/s   (C)   30.0 m/s   (D)   40.0 m/s   **C**

8. A quantity is defined as the product of cross-sectional area and change in momentum per unit length. Which of the following is its SI unit? (A) Nm (B) kgs^{-1} (C) kgm^{2}s^{-1} (D) Nkgs^{-1} **C**

9. A rectangular concrete block 40 cm x 30 cm x 60 cm of mass 10 kg rests on a horizontal flat surface. What is the minimum pressure it can possibly exert on the surface? (A) 816.6 Nm^{-2} (B) 816.6 Nm^2 (C) 408.3 Nm^{-2} (D) 608.4 Nm   **C**

10. A simple hydrometer consists of uniform cylinder suitably weighted to float upright in most common liquids. It is graduated to read the relative density of a liquid directly. Which of the following is NOT correct? (A) When placed in a liquid, it displaces exactly its own weight of the liquid (B) Its graduation increases from top to base (C) When placed in a liquid, it displaces exactly its own volume of the liquid (D) The product of the volume and density of liquid displaced is equal to its mass   **C**

11. A stone which is dropped into a dry well hits the bottom in 2.2 s. How deep is the well? (Take *g=10m/s*) (A) 40.4 m (B) 2.4 m (C) 48.4 m (D) 24.2 m   D

12. A woman whose mass is 70 kg sits 2.4 m from the fulcrum of a seesaw. At what distance from the fulcrum should a 60 kg man sit to balance the seesaw? (A) 2.8 m (B) 2.4 m (C) 3.2 m (D) 3.8 m   A

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13. An air bubble trapped at a depth in a liquid rises to the surface. Which of the following is true about its mass and density as it rises? (A) Its mass and density increase (B) Its mass is constant while its density decreases (C) Its mass and density is constant. (D) Its mass is constant while its density increases. **B**

14. Complete the following sentence: The operation of a hydraulic jack is an application of (A) Pascal's principle. B. Archimedes' principle. (C) Bernoulli's principle. (D) irrotational flow. **A**

15. Complete the following statement: Today, the standard meter is defined in terms of (A) the distance from the earth's equator to the North Pole. (B) the wavelength of light emitted from a krypton atom. (C) the wavelength of light emitted from a sodium atom. (D) the speed of light. **D**

16. Convert 30 metre per second to centimeter per minute (A) 20,000 cm/min (B) 180,000 cm/min (C) 120,000 cm/min (D) 150,000 cm/min **B**

17. During a football match, player A kicks the ball 40 m, 30° E of S to player B who instantly kicks it 30 m, 60° E of N. What is the magnitude of the resultant displacement of the ball? (A) 30 m (B) 40 m (C) 50 m (D) 60 m **C**

18. How much work is done against gravity in sliding a 500 g object through 2 m up a smooth plane that is inclined at 30° to the horizontal? (g = 9.8 ms-2) (A) 9.8 J (B) 19.8 J (C) 16.2 J (D) 4.9 J **D**

19. If a small body of mass m is moving with angular velocity ω in a circle of radius r, what is its kinetic energy? (A) $m\omega r$ (B) $m\omega^2 r/2$ (C) $m\omega r^2/2$ (D) $m\omega^2 r^2/2$ **D**

20. In free fall, two balls of masses 20 kg and 10 kg were dropped from a height. If the ball with the smaller mass reached the ground after 4 s, what is the difference between the time the two balls reach the ground? (A) 8 s (B) 2 s (C) 0 s (D) 4 s **C**

21. In what distance can a 1,500 kg automobile be stopped if the brake is applied when the speed is 20 m/s and the coefficient of sliding friction is 0.7 between the tyres and the ground? (A) 98.10 m (B) 71.67 m (C) 29.15 m (D) 20.10 m **C**

22. The highest point of a simple pendulum bob is 5 cm vertically above the lowest point as it swings to and fro between the two extreme ends. At what velocity does it swing past the lowest point (equilibrium point) where the string is vertical? (take g = 10 m/s2) (A) 1 m/s (B) 2 m/s (C) 5 m/s (D) 10 m/s **A**

23. Three vectors A, B, and C add together to yield zero: A + B + C = 0. The vectors A and C point in opposite directions and their magnitudes are related by the expression: A = 2C. Which one of the following conclusions is correct? (A) A and B have equal magnitudes and point in opposite directions. (B) B and C have equal magnitudes and point in the same direction. (C) B and C have equal magnitudes and point in opposite directions. (D) A and B point in the same direction, but A has twice the magnitude of B. **B**

24. Which of the following could be measured in the same units as force? (A) Energy/distance (B) Energy x distance (C) Energy/time (D) Momentum x distance **A**

25. Which of the following does not affect the pressure at a point beneath the surface of a liquid? (A) Surface area of the liquid. (B) Density of the liquid (C) Depth of the point below the surface (D) Strength of the gravitational field **A**

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26. Which of the following pairs contains one vector and one scalar quantity? (A) Displacement: acceleration (B) Force : kinetic energy (C) Momentum : velocity (D) Power : speed   B

27. Which of the following statements is correct (A) uniform speed always implies uniform velocity (B) uniform speed always implies zero acceleration (C) uniform speed may imply non-zero acceleration (D) constant momentum implies constant acceleration   C

28. Which of the of the following is a measurement taken with Venier callipers? (A) 2.0 cm (B) 2.00 cm (C) 2.000 cm (D) 2.0000 cm   B

29. Which of the units of the following physical quantities are derived? I. Area II. Thrust III. Pressure IV. Mass. (A) I, II, III and IV (B) I, II and III only (C) I, II and IV only (D) I and II only   B

30. Which one of the following situations is *not* possible?   C
    A. A body has zero velocity and non-zero acceleration.
    B. A body travels with a northward velocity and a northward acceleration.
    C. A body travels with a constant velocity and a time-varying acceleration.
    D. A body travels with a constant acceleration and a time-varying velocity.

31.   C

If C is the thermal capacity of a material of mass m and S is its specific heat capacity, then (A) s/m (B) $S = Cm$ (C) $C = Sm$ (D) $DS = m/s$

32. A black car can be more uncomfortably hot on a warm day than a white car because (A) it is hot on a warm day (B) a black object is a better absorber of heat (C) black cars have heaters installed in them (D) white cars have air conditioning systems installed in them   B

33. A little sag is left in overhead telephone wires (A) because taut wires do not conduct sound easily (B) to allow for the effect of a rise in temperature due to heating effect of current flowing through them. (C) to allow for the effect of a rise in temperature of the surrounding atmosphere. (D) to allow for the effect of a fall in temperature of the surrounding atmosphere.   D

34. A piece of copper wire of length 100 cm at 30°C is heated to 120°C. If its linear expansivity is 1.8×10^{-4} / k, its new length is (A) 166.6 cm (B) 101.6 cm (C) 180.6 (D) 1.08 cm   B

35. A sample of a monatomic ideal gas is originally at 20°C. What is the final temperature of the gas if both the pressure and volume are doubled? (A) 5 °C (B) 80 °C (C) 20 °C (D) 899 °C   B

36. A volatile liquid used for cooling purpose in refrigerator is (A) liquid ammonia (B) cold water (C) liquid nitrogen (D) liquid helium   A

37. Complete the following statement: A temperature decrease of 30 C° is equal to a temperature decrease of (A) 30 F°. (B) 17 F°. (C) 30 K. (D) 86 F°.   D

38. Complete the following statement: *Bimetallic strips* used as adjustable switches in electric appliances consist of metal strips that must have different (A) mass. (B) volume. (C) length. (D) expansion coefficients.   D

39. Heat can be transferred from one end of a metal rod in contact with heat to the other end which is in contact with heat through (A) Conduction (B) Convection (C) Radiation (D) Evaporation   A

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40. Heat supplied or removed from a system which causes a change of state without a change in temperature is (A) Specific heat (B) Heat capacity (C) Latent heat (D) Boiling heat — C

41. How many atmospheres of pressure must a litre of gas, initially at a pressure of 1 atmosphere and temperature -20 C, be after it has been compressed to ½ litre at 40 C? A. 2.47 atm. (B) 4.5 atm. (C) 8.0 atm. (D) 3.8 atm. (E) 16.8 atm. — A

42. On a cold day, a good conductor X feels colder to the torch than a poor conductor Y because (A) Y retains more heat than X (B) the temperature of X is lower than that of Y (C) X conducts heat from the body less rapidly than Y (D) X transfers heat from body more rapidly than Y — D

43. The boiling point of water does not depend on (A) the impurities in water (B) the external pressure (C) the quantity of water (D) all of the above — C

44. The ice and steam points of a local liquid in glass thermometer are 10a and 90a respectively. What will the thermometer read when the temperature is 30 C ? (A) 40a (B) 38a (C) 36a (D) 34a — D

45. The lower and upper fixed points on a thermometer are 40 and 120 respectively. Its reading at 60°C is (A) 60 (B) 40 (C) 160 (D) 88 — D

46. The pressure exerted by a given mass of gas in a container (A) Decreases if the container is heated (B) Increases if the molecules of the gas move faster (C) Increases if the volume of the container is doubled (D) Decreases as the kinetic energy of the gas molecules increases — B

47. The temperature in an electric iron is regulated by (A) thermometer (B) bimetallic strip (C) steel (D) conductor — B

48. Water has an anomalous behavior between 0° and 4°C. Which of the following is correct? (A) Mass of water increases between 0 C and 4 C (B) Density of water decreases between 0 C and 4 C (C) Volume of water increases between 0 C and 4 C (D) Volume of water decreases between 0 C and 4 C — D

49. What is the Celsius equivalent of 50.0° F? (A) 10° C (B) 20° C (C) 30° C (D) 40° C — A

50. When water is heated in a glass vessel, the level first falls and then rises because (A) The apparent expansion of the water is initially small and later increases. (B) There is anomalous expansion of water. (C) The glass vessel does not expand. (D) Glass vessel expands first before water starts a more rapid expansion. — D

51. Which of the following quantities of water has undergone the greatest change from its heat content at melting point? (A) 0.5 kg of water at 3 C (B) 0.2 kg of water at 8 C (C) 0.005 kg of water at 80 C (D) 0.1 kg of water at 12 C — B

52. Which would cause a more serious burn: 30 g of steam or 30 g of liquid water, both at 100 °C; and why is this so? (A) Water, because it is denser than steam. (B) Steam, because of its specific heat capacity. (C) Steam, because of its latent heat of vaporization. (D) Water, because its specific heat is greater than that of steam. — C

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B. A certain radioactive element has a half life of 20 years. How long will it take the activity to become ¼ of its original?
20 years (B) 40 years (C) 60 years (D) 80 years — **B**

C. A plane progressive wave is represented by $y = 2\sin(100t - 0.2x)$ where all the symbols have their usual meanings. What is the velocity of the wave?
500 m s^{-1} (B) 400 m s^{-1} (C) 200 m s^{-1} (D) 100 m s^{-1} — **A**

D. A point on a stationary wave where there is no movement of the medium is called (A) Node (B) Antinode (C) Note (D) Amplitude — **A**

56. A uniform wave has a speed of 10m/s and a period of 0.5s. The distance between two nearest crests is (A) 0.2 m (B) 20 m (C) 2 m (D) 5 m — **D**

57. A vibrating string has a tension of and produces a note of when plucked in the Middle. When the length of string is unaltered and the tension is increased to , the frequency becomes
(A) (B) (C) (D) — **C**

58. An organ pipe closed at one end is 80cm long. Determine the frequency of the fundamental note assuming that the speed of sound in air is 340m/s? (A) 213Hz (B) 318Hz (C) 425Hz (D) 106Hz — **D**

59. A transverse wave moves through a medium, the particles of the medium (A) vibrate in a path parallel to the path of the wave (B) do not move (C) vibrate in a path perpendicular to the path of the wave (D) vibrate at an angle of 60o to the path of the wave — **C**

The sound heard after the reflection of sound wave from a plane surface is known as (A) Echo (B) Refraction (C) Vibration (D) Reverberation — **A**

60. Which of the following properties is not common to all waves? (A) Reflection (B) interference (C) Diffraction (D) Polarization — **D**

61. Which of the following statements is true about electromagnetic waves? (A) They are longitudinal (B) They can be seen (C) They have the same frequency in vacuum (D) They travel at the same speed in a vacuum — **D**

62. Which one of the following statements concerning electromagnetic waves is false? (A) Electromagnetic waves are longitudinal waves. (B) Electromagnetic waves transfer energy through space. (C) The existence of electromagnetic waves was predicted by Maxwell. (D) Electromagnetic waves can propagate through a material substance. — **A**

63. Which one of the following statements concerning waves is false? (A) A wave can have both transverse and longitudinal components. (B) A wave carries energy from one place to another. (C) A wave does not result in the bulk flow of the material of its medium. (D) A transverse wave is one in which the disturbance is parallel to the direction of travel. — **D**

64. A light sensitive area at the back of the eye where images are formed is called (A) Yellow Spot (B) Iris (C) Ciliary Muscle (D) Retina — **D**

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65. A luminous object is placed at a given distance from a converging lens of focal length 12 cm and a real image is produced. Find the image distance if it is equal to the object distance. (A) 6 cm (B) 3 cm (C) 12 cm (D) 24 cm   **D**

66. An object is placed 15 cm in front of a concave mirror of radius 40 cm. The image formed is (A) virtual and 60 cm behind the mirror (B) real and 60 cm in front of the mirror (C) virtual and 40 cm from the mirror (D) at infinity   **B**

67. How far from a concave mirror of radius 120 cm must an object be placed such that its erect image is four times its natural size? (A) 72 cm (B) 64 cm (C) 45 cm (D) 50 cm   **C**

68. How many images are formed when an object is placed in front of two plane mirrors that are inclined at angle 30o to each other? (A) 0 (B) 6 (C) 11 (D) 12   **C**

69. Professor Peters walks directly toward a plane mirror at a speed of 0.25 m/s. Determine the speed of the image *relative to him*.
    (A) 0.13 m/s (B) 0.50 m/s (C) 0.25 m/s (D) 0.75 m/s   **B**

70. The angle of incidence in a denser medium when the angle of refraction in the less dense medium is 90° is called a
    (A) Critical angle (B) Reflected angle (C) Incident angle (D) Emergent angle   **A**

71. The driving mirror is a (A) plane mirror (B) convex mirror (C) concave mirror (D) thick plane mirror   **B**

72. The following are types of a converging lens except
    (A) biconvex (B) plano-convex (C) mini-convex (D) converging meniscus   **C**

73. When the Sun, the earth and the moon are in line during their movement, with the earth being the opaque object and casting its shadow on the moon, we have (A) Lunar eclipse (B) Total eclipse (C) Partial eclipse (D) Annular eclipse   **A**

74. Which of the following instruments could be used in finding angle of elevation of the sun? (A) Periscope (B) Telescope (C) Kaleidoscope (D) Sextant   **D**

75. Which of the following optical instruments does not depend on the use of plane mirrors? (A) Kaleidoscope (B) Simple microscope (C) Sextant (D) Simple periscope   **B**

76. Which of the following statements supports the assumption that light travels in straight lines? (A) light can be diffracted (B) light can be reflected (C) a source of light produces interferences patterns on a suitably placed screen (D) a source of light produces distinct shadows of opaque objects   **D**

77. Which of the following is correct about nuclear fission? It is: (A) the splitting of a heavy nucleus into two or more lighter particles (B) an agent used to slow down neutrons in a controlled atomic chain reaction (C) combing light atomic nuclei to form heavy (D) the spontaneous disintegration occurring in the nucleus of certain atoms   **A**

78. A light energy E falls on a metal and the electrons with a maximum kinetic energy of 0.2 eV are ejected. If the work function of the metal is 0.3 eV, what is the value of E? (A) 0.10 eV (B) 0.06 eV (C) 0.50 eV (D) 1.50 eV   **C**

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80. A nucleus is unstable if (A) it has two or more isotopes (B) its binding energy is not sufficient to hold nuclear particles together. (C) it is very light with very low density (D) it has no significant mass. **B**

81. A radioactive substance has a half life of 4 years. If its activity today is 200 dps, its activity in 8 years from today is (A) 50 dps (B) 25 dps (C) 20 dps (D) 10 dps **A**

82. A substance has a half-life of 3min. After 6min, the count rate was observed to be 400. What was its count rate at zero time? (A) 2400 (B) 200 (C) 1200 (D) 1600 **D**

83. An element and its isotopes differ only in the number of (A) electrons (B) neutrons (C) protons (D) irons **B**

84. Complete the following sentence: When electrons from a heated filament accelerate through vacuum toward a positive plate, (A) only an electric field will be produced. (B) only a magnetic field will be produced. (C) electromagnetic waves will be produced. (D) longitudinal waves will be produced. **C**

85. Radioactive elements are (A) chemically reactive elements (B) noble elements (C) rare earth elements (D) elements that spontaneously emit radiation **D**

86. The following radiations are electrically neutral except (A) α-rays (B) Y-rays (C) X-rays (D) neutrons **A**

87. Upon which one of the following parameters does the energy of a photon depend? (A) mass (B) polarization (C) amplitude (D) frequency **D**

88. Which of the following is NOT true about cathode ray? (A) It moves in a straight line (B) It causes fluorescence (C) It possesses a negative charge (D) It can produce -particles **D**

89. Who proposed the planetary model of the nucleus? (A) J. J Thomson (B) Albert Einstein (C) Ernest Rutherford (D) Marie Curie **C**

90. X- rays cannot be used (A) to take photographs of bone structure in the body (B) to detect finger prints (C) to detect flaws in metal castings (D) to detect alterations to works of art **B**

91. 1 farad is equivalent to: (A) 1 coulomb/volt (B) 1 volt/coulomb (C) 1 joules/coulomb (D) 1 ampere/sec. (E) volts per unit charge **A**

92. A 0 - 10mA galvanometer with a coil resistance of 30 ohm can be converted to a 0-10A ammeter by using (A) 0.03ohm series resistor (B) 9.99ohm shunt resistor (C) 0.03ohm shunt resistor (D) 9.99ohm series resistor **C**

93. A battery has an internal resistance of 4 and an emf of 12V. The terminal voltage when a load of 20 Ω is connected across it is: (A) 4 (B) 10 V (C) 20 V (D) 2V **B**

94. A conducting sphere has a net charge of 4.8×10^{17} C. What is the approximate number of excess electrons on the sphere if the fundamental natural charge is -1.6×10^{-19} C (A) 100 (B) 300 (C) 200 (D) 400 **B**

95. A magnet cannot be demagnetized by (A) heating (B) hammering (C) chemical treatment (D) the use of solenoid through which an alternating current is flowing **C**

96. An a.c voltage is connected to an RLC series circuit of resistance 5 Ω, inductance 3 mH and a capacitance of 0.05 μF. Calculate the resonance frequency. (A) 11.0 kHz (B) 12.0 kHz (C) 13.0 kHz (D) 14.0 kHz **C**

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97. An electric heater converts 1KJ of electrical energy to heat energy every 2 second with 100% efficiency. The power produced is (A) 0.5 KW (B) 2 KW (C) 1KW (D) 10W **A**

98. Complete the following statement: The electromotive force is (A) the maximum potential difference between the terminals of a battery. (B) the force that accelerates electrons through a wire when a battery is connected to it. (C) the force that accelerates protons through a wire when a battery is connected to it. (D) the maximum capacitance between the terminals of a battery. **A**

99. If a charged body is moving in a circle on a horizontal plane, what is the general direction of the resulting magnetic field? (A) In the plane of the circle. (B) At an angle 45o to the plane of motion. (C) Along the perpendicular axis through the center of the circle. (D) Along the tangent to the circle. **C**

100. If a resistor is halved in magnitude and the potential across it is tripled, then the ratio of the old current to the new current is (A) 1:3 (B) 3:1 (C) 6:1 (D) 1:6 **D**

101. The angle between the earth's magnetic field and the horizontal is called angle of (A) declination (B) dip (C) variation (D) inclination **B**

102. The basic difference between the galvanometer and the electric motor is (A) The size of the magnetic fields (B) The presence of hair springs in the galvanometer (C) The soft iron armature in the galvanometer (D) The couple formed on the parallel sides of the rectangular coil in the **B**

103. The electromotive force is in such a direction as to oppose the motion or charge producing it. This is a statement of (A) Faraday's Law (B) Lenz Law (C) Maxwell Law (D) Ampere's law **B**

104. The potential difference across the ends of a wire is doubled in magnitude. If Ohm's law is obeyed, one of the following statements concerning the resistance of the wire is true? (A) The resistance is one half of its original value. (B) The resistance is twice its original value. (C) The resistance is not changed. (D) The resistance increases by a factor of four. **C**

105. The process of adding impurity to a semiconductor to increase its conductivity is called (A) Doping (B) Annealing (C) Heating (D) Hardening **A**

106. Which if the following combinations consists of intrinsic properties of materials (A) volume and density (B) density and mass (C) resistance and resistivity (D) density and resistivity. **C**

107. Which of the following can be measured with a potentiometer: (A) Emf of a secondary cell (B) Resistivity of a wire (C) Potential difference across a conductor (D) Resistance of a wire **A**

108. Which of the following devices is odd in the list? (A) thermocouple (B) potentiometer (C) d.c. generator (D) solar cell **B**

109. Which of the following is an essential physical property of the wires used for making fuses? (A) high thermal conductivity (B) low density (C) low melting point (D) low electrical resistivity **C**

110. Which one of the following statements concerning the magnetic force on a charged particle in   D
a magnetic field is true? (A) It is a maximum if the particle is stationary. (B) It is a maximum if the particle moves parallel to the field. (C) It acts in the direction of motion for a positively charged particle. (D) It depends on the component of the particle's velocity that is perpendicular to the field.