Lagos State University
Faculty Of Science
Department of Physics
Harmattan Semester Examination :: 2014/2015 Session

PHY 103 - BASIC HEAT

Time Allowed: 1hr 45mins OPTION C **REPRODUCED BY BUNDAY TUTORIAL**
Instruction: *ATTEMPT ALL QUESTIONS.*
Universal gas constant, R=8.31J/mol.K, Room temp=27^0C, Boltzmann constant (k)=$1.38\times10^{-23}J/K$

1. Which of the following is not a macroscopic parameter? (A) speed (B) temperature (C) pressure (D) chemical composition
2. A system which exchanges neither matter nor heat with its surroundings is called (A) open system (B) closed system (C) isolated system (D) noble system
3. Which of the following is a microscopic parameter? (A) speed (B) temperature (C) pressure (D) chemical composition
4. Equation of state is given by the relation (A) PV=RT (B) PV=2nRT (C) PV=nRT (D) PV=3RT
5. A thermodynamic system is a system that can interact and exchange energy with its surroundings in __ ways (A) 1 (B) 2 (C) 3 (D) 4
6. Work done is equal to zero in (A) Isobaric process (B) Isochoric process (C) Isothermal process (D) Adiabatic process
7. Zeroth law of thermodynamics relates __ bodies in thermal equilibrium with each other (A) two (B) three (C) four (D) five
8. Which of the following represent correctly the first law of thermodynamics? (A) $Q+W=\Delta U$ (B) $Q-W=\Delta U$ (C) $\Delta U=PdV+\Delta Q$ (D) all of the above
9. When a gas expand or is compressed at constant pressure, it is said to undergo __ process (A) Isochoric (B) Isobaric (C) Isothermal (D) Adiabatic
10. A device which produces work from a supply of heat is called (A) heat reservoir (B) heat engine (C) thermocouple (D) dynamite
11. The Carnot cycle consists of __ main reversible processes (A) 2 (B) 4 (C) 6 (D) 8
12. Calculate the maximum efficiency of an engine which operates between two reservoirs at temperature 25^0C and 100^0C (A) 18.11% (B) 20.05% (C) 20.11% (D) 20.22%
13. A Carnot engine is operated between two heat reservoir at temperature 400K and 300K. if the 300K reservoir receives 200 calories from the 400K reservoir. What is the thermal efficiency of the Carnot engine (A) 25% (B) 30% (C) 40% (D) 50%
14. For an Isobaric process work done W is given by (A) $P(V_2-V_1)$ (B) $V(P_2-P_1)$ (C) $P_1(V_2-V_1)/P_2$ (D) none of the above
15. In an Isochoric process which of the following is held constant? (A) Temperature (B) Pressure (C) Volume (D) Heat
16. Which of the following laws of thermodynamics allows the use of the thermometer to measure temperature of a body (A) zeroth law (B) first law (C) second law (D) third law
17. In which of the following processes does the internal energy increase exactly by the amount of work on the system (A) adiabatic (B) isobaric (C) isochoric (D) isothermal
18. The second law of thermodynamics is related to a variable called (A) enthalpy (B) entropy (C) cuse (D) internal energy
19. A thermodynamic process that occurs at constant temperature is called (A) isobaric (B) isochoric (C) isothermal (D) adiabatic

20. What is the initial length of the rod if the coefficient of linear expansion for steel is $1.1 \times 10^{-5} K^{-1}$ (A) 45.45m (B) 46.46m (C) 47.47m (D) 48.48m

21. At what temperature will the reading on the Celsius scale be half of the reading on the Fahrenheit scale (A) $320^0 F$ (B) $220^0 F$ (C) $120^0 F$ (D) $-40^0 F$

22. Classical thermodynamics deals mainly with __ states (A) gas (B) liquid (C) equilibrium (D) solid

23. Which of the following shows that work is done by the system? (A) W¡0 (B) W¿0 (C) W=0 (D) none of the above

24. Which of these indicates that work is done on the system? (A) W¡0 (B) W¿0 (C) W=0 (D) none of the above

25. The triple point temperature of water occurs at __ (A) 273.15K (B) 273.16K (C) 273.17K (D) 273.18K

26. Heat can be transferred by the following process except (A) Radiation (B) Conduction (C) Condensation (D) Convection

27. Which of the following is not an extensive property? (A) Kinetic energy (B) Momentum (C) Mass (D) Density

28. Which of the following is not an intensive property? (A) Velocity (B) Volume (C) Pressure (D) Temperature

29. Which of the following process is a quasi-equilibrium process (A) the stirring and mixing of cold creamies in hot coffee (B) a balloon bursting (C) combustion (D) the slow compression of air in a cylinder

30. The study of the relationship between heat and other forms of energy is called (A) calorimetry (B) optometry (C) Thermodynamics (D) Kinematics

31. The working circle for petroleum engine closely approximates the OTTO cycle, this consist of __ main processes (A) 1 (B) 2 (C) 3 (D) 4

32. The average translational kinetic energy of molecules of an ideal gas is directly proportional to (A) absolute pressure (B) absolute temperature (C) absolute volume (D) absolute mass

33. Which of the following laws indicate thermal equilibrium (A) zeroth law (B) first law (C) second law (D) third law

34. The thermodynamic property which determines the thermal state of a system is the (A) volume (B) temperature (C) pressure (D) all of the above

35. It is impossible to construct an engine which is 100% efficient, this is the statement of the __ law of thermodynamics (A) 1 (B) 2 (C) 3 (D) zeroth

36. The ratio of the work done by the engine to the heat added is called (A) thermal efficiency (B) heat efficiency (C) work efficiency (D) engine efficiency

37. The 1st law of thermodynamics can be restated as (A) $Q_A - Q_R = W$ (B) $Q_A + Q_R = W$ (C) $Q_A - Q_R = 2W/Q$ (D) $Q_A Q_R - (Q_A - Q_R) = W$

38. An ideal gas occupies a volume of 1 litre at 1 atmos and $-50^0 C$. What is the volume occupied when it is compressed to 3 atmos at a temperature of $30^0 C$? (A) 0.45 litre (B) 45 litres (C) 450 litres (D) 4500 litres

39. An idealized engine with such efficiency which will operate in an idealized cycle consist of __ reversible processes (A) one (B) two (C) three (D) four

40. If a closed system absorbs a net amount of heat energy (Q) from its surroundings and does an amount of work (W), the balance (Q-W) is used in raising the __ energy (A) kinetic (B) nuclear (C) internal (D) potential

41. Solids and liquids unlike gases are generally incompressible (A) True (B) False (C) sometimes (D) none

42. The collisions of molecules of gases with each other and with the walls of the container are perfectly (A) elastic (B) inelastic (C) all of the above (D) none of the above

43. The pressure law of gases relates the pressure and __ in direct proportion at constant volume (A) temperature (B) absolute temperature (C) mass (D) volume

44. The rapid and continuous collisions of the fast moving molecules with the wall of the container give rise to the effect called (A) Pressure (B) Volume (C) Temperature (D) Internal energy

45. The combination of Charle's law, Boyle's law and Pressure law give rise to (A) Vanderwaals equation (B) equation of state (C) Boltzmann equation (D) none of the above

46. Which of the following statements is not true about work? (A) Work is a form of energy (B) A Watt is the standard metric unit of work (C) Units of work would be equivalent to a Newton times a meter (D) A kgm^2s^{-2} would be a unit of work (E) A force is applied by a chain to a roller coaster car to carry it up the hill of the first drop of the Shockwave ride

47. All the following statements are true about power except (A) Power is a time-based quantity (B) Power refers to how fast work is done upon an object (C) Powerful people or powerful machines are simply people or machines which always do a lot of work (D) A force is exerted on an object to move it at a constant speed. The power delivered by this force is the magnitude of the force multiplied by the speed of the object (E) The standard metric unit of power is the Watt

48. Which of the following statements is true about kinetic energy? (A) Kinetic energy is the form of mechanical energy which depends upon the position of an object (B) If an object is at rest, then it does not have any kinetic energy (C) If an object is on the ground, then it does not have any kinetic energy (D) The kinetic energy of an object is dependent upon the weight and the speed of an object (E) Faster moving objects always have a greater kinetic energy

49. Calculate the work done if 20N of force acts on the body showing the displacement of 2m? (A) 20Nm (B) 80Nm (C) 100Nm (D) 60Nm (E) 40Nm

50. A boy pushes a box 8m with a force of 15N in a 6 seconds. Find the power the boy used in pushing the box? (A) 20W (B) 180W (C) 200W (D) 60W (E) 50W

51. Kinetic energy is a (A) none quantity (B) vector quantity (C) acceleration quantity (D) scalar quantity (E) vector quantity

52. A body of mass 75kg has a momentum of $1500kgms^{-1}$. Calculate its kinetic energy? (A) 75J (B) 1500J (C) 15000J (D) 750J (E) 2000J