Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
July, 2017

JUL-12 2017

Level: B.Sc.
Year : II
Course : PHYS 206
Semester: I
Exam Roll No. :
Registration No:
Time: 30 mins.
F. M. : 20
Date :

SECTION "A"
[20Q ×1 = 20 marks]

Choose and tick the most appropriate answer.

1. Heat given to an ideal gas under isothermal conditions is used
   [a] in doing the external work
   [b] in increasing the temperature
   [c] in increasing the internal energy
   [d] in increasing the temperature and doing the external work

2. The dependence of extraterrestrial solar radiation on time of year (measured on the plane normal to the radiation) is indicated by the equation
   [a] $G = G_{SC}\left[1+0.33\cos\frac{365n}{360}\right]$ [b] $G = G_{SC}\left[1+0.033\cos\frac{365n}{360}\right]$
   [c] $G = G_{SC}\left[1+0.33\cos\frac{360n}{365}\right]$ [d] $G = G_{SC}\left[1+0.033\cos\frac{360n}{365}\right]$

3. For hydrogen fusion to take place, magnetic confinement uses
   [a] the laser beams or ion beams to heat and expand the hydrogen plasma
   [b] the laser beams or ion beams to heat and squeeze the hydrogen plasma
   [c] the electric and magnetic fields to heat and expand the hydrogen plasma
   [d] the electric and magnetic fields to heat and squeeze the hydrogen plasma

4. To maintain the ideal conditions inside the core of the nuclear reactor, appropriate measurement must be taken through
   [a] moderator
   [b] neutron reflector
   [c] fissionable materials (fuels)
   [d] control rods and core cooling

5. Which one of the following is NOT a green house gas?
   [a] oxygen [b] carbon di-oxide [c] CFC [d] methane

6. The primary air pollutants responsible for acid rain is
   [a] CO_2 [b] SO_2 [c] CO [d] O_3

7. Harmful UV radiation emanating from the Sun are prevented from reaching the earth by the presence of ozone in the
   [a] mesosphere [b] thermosphere [c] stratosphere [d] troposphere

8. A charged particle of mass m and charge q is moving with a velocity v in a magnetic field B. The work done by the magnetic field in moving the particle is given by
   [a] Bqv [b] $\frac{1}{2}mv^2$ [b] Bqv^2 [d] zero

9. The intensity of a sound from a jet plane is 10^{-9} W/m^2. The intensity level of this sound in decibel is
[a] 60 [b] 30 [c] 90 [d] 100

10. If two sources of loudness 20 dB are combined, the resultant loudness is
[a] 23 dB [b] 30 dB [c] 40 dB [d] 10 dB

11. Dry adiabatic lapse rate
[a] is always higher than saturated adiabatic lapse rate
[b] is always lower than saturated adiabatic lapse rate
[c] is always equal to saturated adiabatic lapse rate
[d] can be higher or lower than saturated adiabatic lapse rate depending upon the atmospheric stability.

12. Which one of the following statements about nuclear radiation is true?
[a] α-particles are less ionizing than β-particles
[b] α-particles are more ionizing than γ –rays
[c] β -particles are less penetrating than α-particles
[d] α-particles are more penetrating than γ –rays

13. A freshly prepared radioactive of half-life 2h emits radiation of intensity which is 64 times the permissible safe level. The minimum time after which it would be possible to work safely with this source is
[a] 6 h [b] 12 h [c] 24 h [d] 128 h

14. The phenomenon associated to the transport of energy is
[a] thermal conductivity [b] diffusion
[c] viscosity [d] ambipolar diffusion

15. In a spontaneous nuclear reaction
[a] the total mass of the products = total mass of the reactants
[b] total mass of the products > total mass of the reactants
[c] total mass of the products < total mass of the reactants
[d] nothing can be said for sure

Fill in the blanks:

16. The renewable energy supplies which are mechanical in origin are usually best distributed by .....

17. An ideal refrigerator is used to transfer heat from a freezer at −23°C to the surroundings at 27°C. Its coefficient of performance is .....

18. On 2nd of July, the extraterrestrial solar radiation G (measured on the plane normal to the radiation) has a value of about ..... (W/m^2). (G_{sc} = 1353 W/m^2)

19. Ozone layer is responsible for the absorption of solar radiation of wavelength mainly in the range of.....

20. Singly ionized atoms of an element enter a Bainbridge's mass spectrograph with a velocity selector having electric and magnetic fields 15 KV/m and 0.1 Tesla. The velocity of the ion emerging from the selector is.....m/s.

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SECTION "B"
[5 Q × 4 = 20 marks]

1. Define renewable and non-renewable energy sources with examples. Discuss the variation of extraterrestrial solar radiation.

2. Derive an expression for the power developed (available) due to wind.

OR

Write a note on Sabine's formula and its application.

3. Discuss the nuclear waste disposal and safety measures.

OR

Explain the principle and working of a Geiger-Muller counter with the help of a well labeled diagram.

4. What is meant by half-life and decay constant of a radioactive element? A carbon specimen found in a cave contained 1/8 as much C^{14} as an equal amount of carbon in living matter. Calculate the approximate age of the specimen. Half life of C^{14} is 5568 years.

5. Define lapse rate. Explain why dry adiabatic lapse rate is always more than saturated adiabatic lapse rate.

SECTION "C"
[5 Q × 7 = 35 marks]

6. Define the terms entropy, exergy and anergy. Discuss the loss of exergy in combustion and estimate the loss of exergy with cold reservoir temperature T_C = 300 K and hot reservoir temperature T_H = 2240 K.

7. Define solar constant. Discuss, in detail, with well labeled diagrams, the solar photovoltaic cell/system.

8. What are the conditions for nuclear fusion? Describe the working of a nuclear fusion reactor with a well labeled diagram.

OR

Write short notes on
[a] Ozone layer
[b] Biological effect of nuclear radiation

9. What are the main sources of noise pollution? Explain the auditory and non-auditory effects of noise pollution on our health? How can we reduce the effect of noise?

10. Describe the different layers of the Earth's atmosphere with a well labeled diagram. Explain the variation of temperature with altitude in each layer.

OR

Describe the different shapes of plumes with the help of diagrams and also explain the associated atmospheric stability conditions.