KATHMANDU UNIVERSITY
End Semester Examination
March/April, 2017

Marks scored:

Level : .B. Sc.
Year : III

Course : PHYS 301
Semester : I

Exam. Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : MAR 26 2017

SECTION "A"
[20 Q × 1=10 marks]

Choose and tick the most appropriate answer.

1. All of the following statements are correct except
   [a] Most of the weather activities take place in troposphere.
   [b] For long wave radiation, the albedo for the earth's surface is usually taken as zero.
   [c] Adiabatic lapse rate refers to the actual change in temperature with altitude for the stationary atmosphere.
   [d] In a stationary situation, the energy received from the sun is equal to the energy radiated by the earth into the space.

2. Which one of the following surfaces has the lowest albedo?
   [a] Dry sand [b] Sea water [c] Fresh snow [d] Green forest

3. The layer above the troposphere is the stratosphere which approximately extends from
   [a] 7 to 20 km [b] 17 to 50 km [c] 20 to 50 km [d] 50 to 80 km

4. Since the industrial revolution, specially since 1950, we have been putting enormous quantities of greenhouse gases into the atmosphere, primarily from the agriculture, fuel burning, use of CFCs and deforestation, among which the highest percentage coverage is from the
   [a] agriculture [b] fuel burning [c] use of CFCs [d] deforestation

5. The Antarctic ozone hole occurs during the Antarctic spring from
   [a] March 21 – June 21 [b] June 22 – September 22
   [c] December 22 – March 20 [d] September 23 – December 21

6. The day corresponding to the autumnal equinox and the declination corresponding to the summer solstice are respectively about
   [a] June 22 and 0° [b] September 23 and 0°
   [c] September 23 and +23.5° [d] September 23 and −23.5°

7. Nuclear power plant workers should be constantly monitored
   [a] for nuclear waste disposal
   [b] for proper emergency response
   [c] for any over exposure of nuclear radiation
   [d] to separate them from outside environment

8. If the sound pressure increases from 0.02 Pa to 0.2 Pa, then the sound pressure level increases by
   [a] 20 dB [b] 40 dB [c] 60 dB [d] 80 dB

9. Which of the following phenomenon is associated to the transport of mass?
   [a] viscosity [b] surface tension
   [c] diffusion [d] thermal conductivity

10. A frequently used Lidar method is DIAL which stands for
    [a] Different Absorption Light Detection and Ranging
    [b] Directional Absorption Light Detection and Ranging
    [c] Differential Absorption Light Detection and Ranging
    [d] Differentially Absorbed Light Detection and Ranging

SECTION "B"

[10 Q. × 1 = 10 marks]

Fill in the blanks.

11. The atmospheric ozone absorbs essentially all the radiation below a wavelength of ..... nm.

12. GWP values are based on the heat-absorbing ability of each gas relative to that of .....

13. An endlessly circling whirlpool of stratospheric winds over the polar regions is known as ..... which isolates the air in the center.

14. If G_{sc} = 1353 W/m^2, then the extraterrestrial solar radiation G (measured on the plane normal to the radiation) on September 30 has a value of about ..... (W/m^2).

15. For a HEP station with a head height h and volume flow rate Q, the maximum power output is about ..... kW.

16. The interior of the earth is thought to consist of a central molten core surrounded by a region of semifluid material called the .....

17. Nuclear waste recycling is a new waste disposal method in which the nuclear waste is turned into ..... isotopes.

18. A separation wall has a surface area S and sound insulation of 50 dB. If a small hole of surface area S_1 is made in the wall such that $S_1/S = 10^{-4}$, then the sound insulation is reduced by an amount of about ..... dB.

19. A plume occurs under stable condition, vertical dispersion is restricted so that the pollutants disperse at the stack height horizontally. Such a plume is named as .....

20. The remote sensing satellite LANDSAT 8, launched by NASA, US was originally called LDCM which stands for
    .....

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SECTION "C"
[5 Q. × 4 = 20 marks]

Attempt *ALL* questions.

1. Define the term lapse rate. Show that the atmospheric pressure depends exponentially on the altitude.

2. Explain, in brief, the Antarctic ozone hole.

3. Define solar constant. Discuss the variation of extraterrestrial solar radiation.

OR

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

4. Estimate the amount of energy release during combustion of natural gas (methane) and hence find out the energy content in it in kJ/gm. (Bond energy in kJ/mole for C–H, O–H, O=O and C=O are 410, 460, 494 and 799 respectively)

OR

Define the terms acoustic intensity and power. If two machines produce 80 dB sound pressure level each, what is the total sound pressure level in dB?

5. Discuss the management of nuclear fuel cycle.

OR

Explain the global positioning system (GPS) with its components.

SECTION "D"
[5 Q. × 7 = 35 marks]

Attempt *ALL* questions.

6. Describe the different layers of earth's atmosphere with the help of a well labeled diagram. Explain the variation of temperature, pressure and air density with altitude in each layer.

7. What do you mean by greenhouse effect and greenhouse gases? Mention some of the greenhouse gases with their main anthropogenic sources. Discuss the possible impacts of global warming.

OR

Discuss the ozone formation and ozone depletion process in the atmosphere. Explain the consequences of ozone depletion.

8. Differentiate between energy, 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.

9. Explain the different methods of disposal of nuclear waste and discuss the nuclear hazards and safety measures.

OR

What do you mean by noise and noise pollution? Write down the sources of noise pollution. Explain the auditory and non-auditory effects of noise on human health.

10. Describe briefly the three transport phenomena associated to the transport of mass, momentum and energy. Discuss the pollutant dispersion and plume theories with well labeled diagrams.

OR

Define the term remote sensing (RS). Explain the principles, types and system overview of remote sensing. Discuss the specific techniques used to analyze the environment.