F.Y.B.SC. SEM – I (CBCS - 2016 Course) : WINTER - 2018

SUBJECT : PHYSICS : MODERN PHYSICS

Day : Wednesday
Date : 17/10/2018

W-2018-0683

Time : 11.00 A.M TO 02.00 PM
Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of logarithmic table / calculator is **ALLOWED**.
4) Draw neat and labeled diagram **WHEREVER** necessary.
5) All the symbols have their usual meaning unless otherwise state.

Q.1 A) Select and write the most appropriate answer from the given alternatives for each sub question: **[06]**

i) Wavelength of electromagnet wave of frequency 6×10^{12} Hz in free space is _____.

a) 6×10^{-12}m **b)** 0.5×10^{-4} m **c)** 6.6×10^{-12}m **d)** 0.6×10^{-4} m

ii) _____ series is found in the visible region.

a) Lyman **b)** Pfund **c)** Balmer **d)** Paschen

iii) Nuclei having same atomic number but different atomic mass number are _____.

a) isotopes **b)** iostones **c)** isobars **d)** none of the above

iv) _____ instrument is used to measure intensity of direct solar radiation at normal incidence.

a) Velocine pyranometer **c)** Yellot solarimeter
b) Bimetallic actinography **d)** Pyrheliometer

v) Ozone layer is present in _____.

a) troposphere **b)** mesosphere **c)** stratosphere **d)** ionosphere

vi) In India for quick measurement of solar radiation _____ is used.

a) Suryamapi **c)** Eppley pyranometer
b) Pyrheliometer **d)** Thermoelectric pyranometer

B) Attempt all the following: **[06]**

i) Define optical pumping.

ii) State first postulate of Bohr's theory of hydrogen atom.

iii) State any two applications of microwaves.

iv) Write the number of protons and neutrons in $_{56}Ba^{144}$.

v) State the locations, where tidal energy is used for production of electricity.

vi) What is frequency of wave with wavelength of 200 cm?

P.T.O.

Q.2 Attempt **ANY THREE** of the following: **[12]**

a) What is LASER? State its characteristics.

b) Write note on p-i-n diode solar cell.

c) State and prove Bohr's correspondence principle.

d) Explain need and importance of renewable energy sources.

Q.3 Attempt **ANY FOUR** of the following: **[12]**

a) Find the shortest wavelength of Lyman series of hydrogen spectrum.
$[R = 1.097 \times 10^{7}/\,m]$

b) What is nuclear force? State its characteristics.

c) State characteristics and uses of X-rays.

d) Write note on 'Pyroelectric Thermometer'.

e) Define chemical bond. What are the different types of chemical bond?

Q.4 Attempt **ANY TWO** of the following: **[12]**

a) Describe Frank and Hertz experiment.

b) Define fill factor and efficiency of solar cell. Also calculate the fill factor of solar cell using following data:
$V_{oc} = 640$ mv $\quad I_{sc} = 56$ mA
$V_m = 530$mv $\quad I_m = 43$ mA

c) Write note on 'Domestic solar water heater'.

Q.5 Attempt **ANY TWO** of the following: **[12]**

a) Draw energy level diagram for the hydrogen atom, hence explain different series in hydrogen spectrum.

b) Describe construction and working of solar cell. State the uses of solar cell.

c) Calculate B.E. per nucleon for $_{15}P^{31}$. The mass of $_{15}P^{31}$ is 30.9738 amu.
$\left[\begin{array}{l}\text{mass of proton } m_p = 1.0073\,\text{amu} \\ \text{mass of neuton } m_n = 1.0087\text{amu}\end{array}\right]$

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