

**West Bengal State University**  
**B.A./B.Sc./B.Com. (Honours, Major, General) Examinations, 2013**

**PART-II**

**CHEMISTRY — HONOURS**

**Paper - IV**

**( NEW & OLD SYLLABUS )**

Duration : 2 Hours

[ Maximum Marks : 50

*Candidates are required to give their answers in their own words as far as practicable.*

*Marks will be deducted for spelling mistakes, untidiness and bad handwriting.*

*The figures in the margin indicate full marks.*

**Use separate answer script for each Group.**

**( NEW SYLLABUS )**

**( Physical Chemistry )**

**CEMAT 24-PA**

Attempt *two* questions taking *one* question from each Unit.

**UNIT - I**

1. a) Write down the Planck distribution law for black body radiation in one convenient form and hence show that the wavelength corresponding to the maximum energy density is inversely proportional to the absolute temperature. [ Assume  $hc / \lambda kT \gg 1$ , terms have their usual significance.] 1 + 3
  - b) Show that for a particle in a cubical box, the energy level having energy three times to that of lowest energy level, is three fold degenerate. 3
  - c) Determine the value of  $x$  at which the first excited wave function of the simple harmonic oscillator exhibits maximum or minimum. 3
- [ Given :  $\psi_1(x) = \left(\frac{\alpha}{4\pi}\right)^{1/4} (2\alpha^{1/2}x) e^{-\alpha x^2/2}$ ;  $\alpha = (k\mu)^{1/2}/\hbar$ ,  
 $k = \text{force constant, } \mu = \text{reduced mass.}$  ] 3
- d) When a metal surface is irradiated by light of wavelength 300 nm the stopping potential is found to be 0.5 V. Calculate the work function and the threshold wavelength. [ Given :  $1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$  ] 3

$$W.F = 5.82 \times 10^{-19} \text{ J} = 3.63 \text{ eV}$$

Threshold wavelength 342 nm

