I B. Tech I Semester Regular Examinations Feb./Mar. - 2014
ENGINEERING CHEMISTRY
(Common to CE,ME,CSE,PCE,IT,Chem E,Aero E,AME,Min E,PE,Metal E)

Time: 3 hours   **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1.(a) Discuss (i) p-type doped conducting polymers (ii) phosphate conditioning
(iii) antiknocking agents

(b) Write a note on protection (against corrosion) of a metal by metallic coatings.

(c) A 0.1 M KCl solution, whose specific conductance is 0.01571 mho cm^{-1}, has a
conductance of 0.014 mho. When the same conductivity cell is used a 0.1 M chloroacetic
acid solution has a conductance of 7.84 x 10^{-3} mho. If the ionic conductance of
$ClCH_2COO^-$ and H^+ are 59.8 and 449.8 mhocm^{2}equiv.$^{-1}$, find the degree of dissociation
of chloroacetic acid.

[12+4+6]

PART-B

2.(a) Describe cold and hot lime soda processes with a neat diagram.

(b) A sample of water on analysis has been found to contain the following in ppm:
Ca (HCO$_3$)$_2$ = 4.86; Mg (HCO$_3$)$_2$ = 5.84, CaSO$_4$ = 6.8, MgSO$_4$ = 8.4. Calculate the
temporary and permanent hardness of water.

(c) Discuss (i) stereospecific polymers (ii) mechanical properties of polymers

[6+4+6]

3.(a) What is ion-selective electrode? Explain its working.

(b) Discuss potentiometric titrations.

(c) Write notes on (i) Refining of petrol (ii) reforming

[6+4+6]

4.(a) Explain the factors effecting the rate of corrosion.

(b) Write notes on Electroplating

(c) Discuss (i) bullet proof plastics (ii) green house effects

[6+4+6]

5.(a) Explain compounding and vulcanization of rubber.

(b) What is copolymerization. Give any two examples.

(c) Write notes on (i) caustic embrittlement (ii) galvanizing

[7+3+6]

6.(a) Write notes on (i) LPG (ii) diesel knocking (iii) Ni-Cd battery

(b) A sample of coal was found to contain the following constituents: C = 81%; O=7%;
S=2%; N=5.5% and ash=4.5%. Calculate the minimum amount of air required for
complete combustion of 1 kg of coal.

(c) Explain break-point chlorination of water.

[9+4+3]

7.(a) Write any four applications of carbon nanotubes.

(b) Explain the working of photovoltaic cells with a neat sketch.

(c) Write notes on (ii) Impressed current cathodic protection (ii) galvanic cell

[5+5+6]

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*****

PART-A

1.(a)   Name the various fractions obtained during fractional distillation of crude oil and indicate their boiling point ranges and uses of various fractions.

(b)   The ion conductance of H^+ and butyrate ions are 339.8 and 30.6 Scm^2 $equiv^{-1}$ respectively. When same conductance cell is employed 0.1 M KCl and 0.1 M butyric acid recorded conductances of 1.3×10^{-2} and 5.25×10^{-4} Scm^2 respectively . If the conductivity of the above KCl solution is 0.0121 S cm^{-1}, calculate the degree of dissociation of butyric acid.

(c)   Write notes on (i) turbine deposits (ii) Anodized coatings (iii) Solar reflectors

[6+7+9]

PART-B

2.(a)   Describe (i) zeolite process (ii) Priming and foaming

(b)   Calculate the amount of lime and soda required for the softening of 150 liters of water, which is analyzed as: temporary hardness = 20 ppm; permanent hardness = 15 ppm; permanent Mg hardness = 10 ppm.

(c)   Discuss the preparation of Bakelite and Thiokol and mention their uses.

[6+4+6]

3.(a)   Explain with neat diagrams the working of (i) glass electrode (ii) concentration cell (iii) Lechlanche cell

(b)   Describe any one method of catalytic cracking process for obtaining gasoline.

[10+6]

4.(a)   Explain electrochemical corrosion.

(b)   Explain galvanizing and tinning.

(c)   Describe any two methods of synthesis in green chemistry.

[6+4+6]

5.(a)   Describe with neat sketches, any two moulding techniques of plastics.

(b)   What are the drawbacks of natural rubber.

(c)   What are the different constituents of paints and give their function.

(d)   Write notes on caustic embrittlement.

[6+4+3+3]

6.(a)   Define calorific value, HCV and LCV. Calculate the gross and net calorific value of coal having the following compositions C = 83%; H = 10%; S = 1%, N = 3%, Ash = 3%. Latent heat of steam = 587 cal/g.

(b)   Discuss (i) applications of Kohlrausch law (ii) scales and sludges

[10+6]

7.(a)   Write notes on (i) deterioration of cement concrete (ii) Types of Liquid crystals (iii) Need of green chemistry

(b)   Explain (i) electrochemical cell (ii) metal cladding

[10+6]

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Time: 3 hours   **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1.(a) Write notes on (ii) CNG (ii) properties of Thiokol (iii) phosphate coatings
 (b) Explain the mechanism of setting and hardening of cement.
 (c) Calculate the amount of lime (84% pure) and soda (92% pure) required for softening
      10, 000 litres of water containing the following salts per litre:
      $Ca(HCO_3)_2$ = 40.5 mg; $Mg(HCO_3)_2$ = 36.5 mg; $MgSO_4$ = 30 mg; $CaSO_4$ = 34 mg;
      $CaCl_2$ = 27.75 mg and NaCl = 10 mg. Also calculate the temporary hardness and
      permanent hardness of the water sample.

                                                                    [7+6+9]

PART-B

2.(a) Describe with neat sketch ion exchange process of softening of water.
 (b) Write notes on (i) scales and sludges (ii) tacticity
 (c) What is condensation polymerization? Explain with example.

                                                                    [6+8+2]

3.(a) Describe the construction and working of hydrogen-oxygen fuel cell.
 (b) At 25 ^{0}C, the equivalent conductivities at infinite dilution of HCl, CH_3COONa and NaCl
      are 428.03, 93.3, and 125.78 ohm^{-1}cm^2 equiv^{-1} respectively. Calculate the equivalent
      conductance of acetic acid at infinite dilution
 (c)   Discuss the ultimate analysis of coal

                                                                    [7+3+6]

4.(a) Discuss the mechanism of dry corrosion. Explain the role of oxide film in dry corrosion.
 (b) Explain the importance of design and selection of materials in controlling corrosion.
 (c) Describe any two preparation methods for carbon nanotubes with neat sketch diagrams.

                                                                    [6+4+6]

5.(a) Explain free radical mechanism of addition polymerization.
 (b) Write the preparation and uses of (i) PVC (ii) Bakelite
 (c) Write notes on (i) Reverse Osmosis (ii) anodic and cathodic inhibitors

                                                                    [4+6+6]

6.   Write notes on (i) refining (ii) octane number (iii) antiknocking agents (iv) cold lime soda
       process (v) calomel electrode

                                                                    [16]

7.(a) Write any four applications of (i) green chemistry (ii) liquid crystals (iii) fullerenes
 (b) Write notes on (i) drying, semidrying and nondrying oils (ii) Kohlrausch law

                                                                    [10+6]

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Time: 3 hours   **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1.(a) Write notes on (i) breakpoint chlorination (ii) ionic liquids as green solvents for green synthesis (iii) electroless plating

  (b) A sample of coal containing 93% C; 5% H; 2% ash. When this coal was tested in the laboratory for its calorific value in the bomb calorimeter, the following data was obtained: Weight of coal burnt = 0.95 g; Weight of water taken = 600g water equivalent of bomb and calorimeter = 2,000 g, rise of temperature = 2.84^0C; Cooling correction = 0.02^0C; Fuse wire correction = 12.0 cal; acid correction = 55 cal. Calculate the net and gross calorific value of the coal in cal/g. (Assume the latent heat of condensation of steam as 580 cal/g)

  (c) Compare galvanic series with electrochemical series.

                                                                        [12+5+5]

PART-B

2.(a) Write notes on (i) demineralization process (ii) sterilization of water

  (b) A sample of water contains the following dissolved salts per litre: $Mg(HCO_3)_2$ = 25 mg; $MgCl_2$ = 28 mg; $CaSO_4$ = 24 mg; $CaCl_2$ = 84 mg. Calculate the temporary and permanent hardness.

  (c) Discuss the physical and mechanical properties of polymers.

                                                                        [6+4+6]

3.(a)   What are secondary batteries? Give an example and explain its construction and working.

  (b) Describe conductometric titrations of acids and bases.

  (c) Write notes on (i) petrol knocking and diesel knocking (ii) characteristics of a good fuel.

                                                                        [5+5+6]

4.(a) Discuss on differential aeration corrosion

  (b) Write notes on (i) Pilling- Bed worth rule (ii) passivity (iii) solar cells (iv) chemical vapour deposition method of CNTs

                                                                        [4+12]

5.(a) Write notes on (i) stereospecific polymers (ii) Injection moulding (iii) vulcanization

  (b) Explain (i) metal cladding (ii) calgon and phosphate conditioning

                                                                        [10+6]

6.(a) Describe moving bed catalytic cracking method with a neat labeled diagram.

  (b) Write notes on flue analysis and its significance.

  (c) Explain how specific and equivalent conductances of a strong electrolyte vary with dilution.

  (d) Discuss boiler corrosion.

                                                                        [6+4+3+3]

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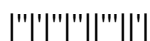
7.(a) Write notes on (i) applications of liquid crystals (ii) any one method of green synthesis (iii) fiber reinforced plastics

   (b) Discuss sacrificial anodic protection method.

   (c) Calculate the emf of the following cell: Zn (s)/Zn^{2+} (0.1 M)// Cu^{2+} (1.50M)/Cu(s) at 25°C. E^o $_{Zn2+/ Zn (s)}$ = -0.76 V and E^o $_{Cu2+ /Cu(s)}$ = +0.34 V.

   [10+3+3]

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I B. Tech I Semester Regular Examinations Feb./Mar. - 2014
MATHEMATICS-II (MATHEMATICAL METHODS)
(Common to ECE, EEE, EIE, Bio-Tech, EComE, Agri.E)

Time: 3 hours   **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1.(i)   Write the sufficient condition for the convergence of Newton-Raphson method?
  (ii) Show that $\mu\delta = \frac{1}{2}(\Delta + \nabla)$?
  (iii) Write the merits and demerits of Euler Modified method?
  (iv) Write the Dirichlet's conditions of f(x)?
  (v)   State Initial and Final value theorems of Z-transforms?
  (vi) Write the statement of Fourier integral theorem?

[3+4+4+3+4+4]

PART- B

2.(a)   Using Runge-Kutta method of fourth order solve
        $y' = xy,\ y(1) = 2\ at\ x = 1.2\ with\ h = 0.2.$
  (b)   Find the Fourier transform of $f(x) = x^{n-1}$

[8+8]

3.   For the following data estimate f (1.720) using forward,   f (2.68) using backward and
        f (2.36) using central difference formula.

x	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
f(x)	0.0495	0.0605	0.0739	0.0903	0.1102	0.1346	0.1644	0.2009

[16]

4.(a)   Solve the differential equation $\frac{dy}{dx} = x + y$ subject to $y(0) = 1$ by Picard's method
        and hence find $y(0.2)$.
  (b)   Using Regula Falsi method find a real root of $f(x) = 2x^7 + x^5 + 1 = 0$ correct upto
        two decimal places.

[8+8]

5.(a)   Find the Fourier series for $f(x) = 2lx - x^2\ in\ (0, 2l)$, hence show that
        $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ \dots\ = \frac{\pi^2}{12}$
  (b)   Find the inverse Z transform of $\frac{3z^2+z}{(5z-1)(5z-2)}$

[8+8]

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6.(a) Find the Fourier transform of $f(x) = \begin{cases} 1 - x^2, |x| < 1 \\ 0, \quad |x| > 1 \end{cases}$

(b) Find a real root of $f(x) = x + \log x - 2$ using Newton-Raphson method.

[8+8]

7.(a) Find Z-transform of (i) $an^2 + bn + c$ (ii) $\sin(3n + 5)$

(b) Find the half range Fourier sine series for $f(x) = x$ in $(0, \pi)$?

[8+8]

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Time: 3 hours   **Max. Marks: 70**

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*****

PART-A

1.(i)   State Intermediate Value theorem?
 (ii)   Show that$\Delta(e^{ax} \log bx)$?
 (iii) Write the second order Runge-Kutta formula?
 (iv)   Give any one application of Fourer Series with example?
 (v)   State the convolution theorem of inverse Z-transforms?
 (vi)   Write the formulas Fourier cosine and sine transform?

[4+3+4+3+4+4]

PART- B

2.(a)   Using modified Euler's method to find the value of y at x = 0.2 with h = 0.1 where
        $y' = 1 - y, \ y(0) = 0$

 (b)   Find the Fourier transform of $f(x) = \begin{cases} 0, |x| < a \\ 1, |x| > a \end{cases}$

[8+8]

3.(a)   Prove the relation $\sum_{k=0}^{n-1} \Delta^2 f_k \equiv \Delta f_k - \Delta f_0$
 (b)   Use Lagrange's interpolation formula to calculate f(3) from the following table.

x	0	1	2	4	5	6
f(x)	1	14	15	5	6	19

[4+12]

4.(a)   Solve the differential equation $\frac{dy}{dx} =$x^{2}y subject to $y(0)$ =1 by Taylor series method
        and hence find y(0.1), $y(0.2)$.
 (b)   Using bisection method find a root of $f(x) = x - \cos x = 0$.

[8+8]

5.(a)   Obtain the Fourier series for $f(x) = |x| \ in \ [-\pi, \pi]$, hence show that
        $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{\pi^2}{8}$
 (b)   Solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n \ with \ u_0 = 0; u_1 = 1$ using Z transforms

[8+8]

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6.(a) Using Fourier integral, prove that $e^{-ax} = \frac{2a}{\pi} \int_0^\infty \frac{\cos ax}{a^2+\alpha^2} d\alpha, \ \ a > 0, x > 0$

(b) Find a real root of $f(x) = x\log_{10}x = 1.2$ using Newton-Raphson method.

[8+8]

7.(a) Find the Z transform of $(i) \cos(n + 1)\theta$ $(ii) \sin h \ \frac{n\pi}{2}$

(b) Obtain the Fourier series for spectrum of a periodic function with example?

[8+8]

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*****

PART-A

1.(i)   Write the sufficient condition for the convergence of Newton-Raphson method?

(ii)   Show that $\mu\delta = \frac{1}{2}(\Delta + \nabla)$?

(iii)   Write the advantages & disadvantages of Taylor series method?

(iv)   Write the Fourier series when the given function f(x) is an even?

(v)   Write the properties of multiplication by n and division by n of Z-transforms?

(vi)   Write the complex form of Fourier integral theorem?

[3+3+4+4+4+4]

PART- B

2.(a)   Using iteration method find a real root of $f(x) = x^2 - 3x + 1$ correct upto three decimal places starting with x=1.

(b)   Solve $u_{n+2} - 2u_{n+1} + u_n = 3n + 5$ using Z-Transforms?

[8+8]

3.(a)   Evaluate $\Delta(e^{ax} \log bx)$

(b)   By using Lagrange's interpolation formula, fit a polynomial data

x	0	1	3	4
f(x)	-12	0	6	12

[4+12]

4.(a)   Using modified Euler method solve numerically the equation $\frac{dy}{dx} = 2 + \sqrt{xy}$ with $y(1) = 1$ to find $y(1.2)$

(b)   Find f(x) if its Fourier sine transform is $\dfrac{s}{1 + s^2}$

[8+8]

5.(a)   Obtain the Fourier series for $f(x) = (\pi - x)^2$ in $0 < x < 2\pi$, hence deduce that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots = \frac{\pi^2}{6}$

(b)   Using convolution theorem, evaluate $Z^{-1}[\frac{z^2}{z^2 - 4z + 3}]$

[8+8]

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6.(a) Using Parseval's identities, prove that $\int_{0}^{\infty} \dfrac{dt}{(a^2+t^2)(b^2+t^2)} = \dfrac{\pi}{2ab(a+b)}$

(b) Using Runge-Kutta method of third order, find the values of $y(x)$ for $x = 0.1, 0.2$ where $y' = x - 2y,\ y(0) = 1$.

[8+8]

7.(a) Find the half range sine series for $f(x) = x(\pi - x)$ in $(0, \pi)$

(b) Find a real root of $f(x) = x^3 - 19$ correct upto three decimal places using Newton-Raphson method

[8+8]

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PART-A

1.(i)   Show that $\mu\delta = \frac{1}{2}(\Delta + \nabla)$?

(ii)   Write the merits and demerits of Iteration method?

(iii)   Write the merits and demerits of Euler Modified method?

(iv)   Write the Dirichlet's conditions of f(x)?

(v)   State convolution theorem of Z-transforms?

(vi)   Write the statement of Fourier integral theorem?

[3+4+4+3+4+4]

PART- B

2.(a)   Find the Fourier sine and cosine transforms of $(2.e^{-5x} + 5.e^{-2x})$.

(b)   Given $f(x) = \begin{cases} 1 - x, & -\pi \le x \le 0 \\ 1 + x, & 0 \le x \le \pi \end{cases}$

Is the function even or odd? Find the Fourier series for f(x).

[8+8]

3.(a)   Prove the relation between *E* and *D*?

(b)   For the following data estimate K (0.25) using backward difference formula.

m	0.20	0.22	0.24	0.26	0.28	0.30
K(m)	1.659624	1.669850	1.680373	1.691208	1.702374	1.713889

[4+12]

4.(a)   Solve the differential equation $\frac{dy}{dx} = 1 + xy$ subject to $y(0) = 1$ by Taylor series method and hence find $y(0.2)$.

(b)   Solve the difference equation $y_{n+2} + 3y_{n+1} + 2y_n = 0$, $y_0 = 1$, $y_1 = 2$ by z – transform.

[8+8]

5.(a)   Find the Fourier series of $f(x) = x + x^2, -\pi < x < \pi$ and hence deduce the series

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \dots = \frac{\pi^2}{12}$$

(b)   Apply Runge - Kutta Method to find $y(0.1)$ and $y(0.2)$ where $\frac{dy}{dx} = x^2 - y$ and $y(0) = 1$.

[8+8]

|'|'|'|'|'||'''||'|'|

6.(a) Find the Fourier transform of $e^{-|x|}$

(b) Using Regula Falsi method find a real root of $f(x) = 2x^7 + x^5 + 1 = 0$ correct upto two decimal places.

[8+8]

7.(a) Find $z(\frac{1}{n!})$ and hence evaluate $z\left(\frac{1}{(n+1)!}\right)$ and $z\left(\frac{1}{(n+2)!}\right)$

(b) Find a real root of $f(x) = x + \log x - 2$ using Newton-Raphson method.

[8+8]

Set No. 1

I B.Tech I Semester Supplementary Examinations, Feb/Mar 2014
ENGINEERING PHYSICS-I
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

Time: 3 hours   **Max Marks: 75**
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Explain the interference of light due to thin films.
   (b) What is Coherent Length? Explain   [12+3]

2. (a) Explain Rayleigh's criterion of resolution.
   (b) Write a note on resolving power of a grating.   [9+6]

3. (a) Discuss the various methods by which polarized light can be produced?
   (b) The refractive index of glass is 1.5. Calculate the Brewster's angle for it. Also calculate the angle of refraction.   [9+6]

4. (a) What is Primitive cell? How does it differs from unit cell?
   (b) Illustrate the SC, BCC and FCC crystal structures.
   (c) Write different crystal systems   [3+9+3]

5. (a) Explain the principle, procedure and advantage of Debye-Scherrer method of X-ray diffraction.
   (b) Obtain Miller indices of a plane which intercepts at a, b/2 and 3c in simple cubic unit cell. Draw a neat diagram showing the plane.   [11+4]

6. (a) What are important characteristics of Laser?
   (b) What are the Scientific, Industrial and Medical applications of Laser?
   (c) What is the role of optical cavity and active medium in a Laser   [4+6+5]

7. (a) What are the conditions to produce total internal reflection in optical fiber.
   (b) Describe structure of different types of Optical fibers with ray paths.
   (c) Calculate the angle of acceptance of a given optical fiber, if the refractive indices of the core and the cladding are 1.563 and 1.498 respectively. [3+8+4]

8. (a) Explain the working of Ultrasonic flaw detector.
   (b) Explain three different and most common types of scans used in Ultrasonic inspection.   [6+9]

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Set No. 2

I B.Tech I Semester Supplementary Examinations, Feb/Mar 2014
ENGINEERING PHYSICS-I
(Common to Civil Engineering, Electrical & Electronics Engineering,
Mechanical Engineering, Electronics & Communication Engineering,
Computer Science & Engineering, Chemical Engineering, Electronics &
Instrumentation Engineering, Bio-Medical Engineering, Information
Technology, Electronics & Computer Engineering, Aeronautical
Engineering, Bio-Technology, Automobile Engineering, Mining and
Petroliem Technology)

Time: 3 hours   Max Marks: 75
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) State and explain Superposition principle?

   (b) With ray diagram discuss the theory of thin films and derive the condition for constructive and destructive interference in the case of reflected system.

   [3+12]

2. (a) What is meant by diffraction of light? Explain.

   (b) What is Rayleigh's Criterion for resolving power?

   (c) Define Resolving power of a grating. Derive the expression for Resolving power of a grating based on Rayleigh's Criterion.   [3+6+6]

3. (a) What do you mean by Polarisation?

   (b) Distinguish between Polarised and Unpolarised lights.

   (c) Discuss how the Circular and Elliptical Polarised lights can be produced?

   [4+5+6]

4. (a) Explain the terms:
      (i) Space Lattice (ii) Basis (iii) Unit Cell (iv) Primitive Cell

   (b) Write notes on Bravias lattices

   (c) Lithium crystallizes in BCC structure. Calculate the lattice constant, given that atomic weight and density of Lithium are 6.94 and 530 kg/m³respectively.

   [8+3+4]

5. (a) Derive Bragg's law and obtain the limiting condition for it.

   (b) Obtain Miller indices of a plane which intercepts at a, b/2 and 3c in simple cubic unit cell. Draw a neat diagram showing the plane.   [11+4]

6. (a) Explain the construction and working of Ruby laser.

   (b) What are the differences between Homo junction Laser and Hetero junction Laser?   [10+5]

Set No. 2

7. (a) Explain how the optical fibers are classified.

   (b) Explain the applications of optical fibers

   (c) An optical fiber has a numerical aperture of 0.2 and a cladding refractive index of 1.59. Find the acceptance angle for the fiber in water which has a refractive index of 1.33.   [6+5+4]

8. (a) Explain the basic principle of ultrasonic testing.

   (b) What are the advantages and limitations of ultrasonic testing.   [5+10]

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Set No. 3

I B.Tech I Semester Supplementary Examinations, Feb/Mar 2014
ENGINEERING PHYSICS-I
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

Time: 3 hours   Max Marks: 75
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Discuss the theory of Newton's rings with relevant diagram.

   (b) Derive the expression for the diameters of dark and bright rings.   [6+8]

2. (a) Describe Fraunhofer diffraction due to single slit.

   (b) Describe the action of plane transmission grating in producing diffraction spectrum.

   (c) Show that the grating with 500 lines/cm cannot give a spectrum in the 4th order for the light of wavelength 5890.   [6+5+4]

3. (a) What is quarter wave plate? Deduce expression for its thickness

   (b) Draw a ray diagram for extraordinary and ordinary rays before and after passing through a quarter wave plate.

   (c) At what wavelength, the given quarter wave plate of wavelength 600nm will act as half wave plate.

4. (a) Explain the terms 'Unit Cell', 'Basis' and 'Space lattice'.

   (b) Obtain the relation between the edge of the unit cell and atomic radius for SC, BCC and FCC lattices.

   (c) Chromium has BCC structure. Its atomic radius is 0.1249 nm. Calculate the free volume per unit cell.   [3+8+4]

5. (a) What are Miller indices? How are they obtained?

   (b) Deduce the expression for the interplanar distance in terms of Miller indices for a cubic system.

   (c) Obtain Miller indices of a plane which intercepts at a, b/2 and 3c in simple cubic unit cell. Draw a neat diagram showing the plane.   [5+6+4]

6. (a) Distinguish between Spontaneous and Stimulated emissions.

   (b) What is the reason for mono chromaticity of laser beam?

(c) Derive the expression for energy density of radiation in terms of Einstein coefficients. [5+3+7]

7. (a) Define acceptance angle and derive expression for it in terms of fractional index change.

(b) Write notes on scattering and Absorption loss in the optical fibers. [11+4]

8. (a) What is ultrasonic testing and explain the basic principle?
(b) What are the properties of Ultrasonic Waves? [10+5]

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Set No. 4

I B.Tech I Semester Supplementary Examinations, Feb/Mar 2014
ENGINEERING PHYSICS-I
(Common to Civil Engineering, Electrical & Electronics Engineering,
Mechanical Engineering, Electronics & Communication Engineering,
Computer Science & Engineering, Chemical Engineering, Electronics &
Instrumentation Engineering, Bio-Medical Engineering, Information
Technology, Electronics & Computer Engineering, Aeronautical
Engineering, Bio-Technology, Automobile Engineering, Mining and
Petroliem Technology)

Time: 3 hours   Max Marks: 75
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Discuss the theory of Newton's rings with relevant diagram.
   (b) Derive the expression for the diameters of dark and bright rings.   [6+8]

2. (a) What are the types of diffractions and give the differences between them.
   (b) Obtain the condition for primary maxima in Fraunhofer diffraction due to single slit and derive an expression for width of the central maxima.   [5+10]

3. (a) What is meant by Double Refraction?
   (b) Write notes on Optic axis and its characteristics.
   (c) Discuss the construction and action of Nicol prism.   [2+5+8]

4. (a) Define Packing fraction and Show that FCC crystals are closely packed than BCC crystals.
   (b) Explain the crystal structures of BCC and FCC crystals.   [9+6]

5. (a) Explain how the crystal structure will be determined by Laue method?
   (b) Derive the expression for the Bragg's law.   [7+8]

6. (a) Derive Einstein coefficients and explain their significance?
   (b) Describe the construction and working of a semiconductor Laser?   [7+8]

7. (a) Describe the construction of an optical fiber and give typical dimensions of various parts.
   (b) Write notes on Attenuation losses in optical fiber communication.
   (c) Calculate the angle of acceptance of a given optical fiber, if the refractive indices of the core and cladding 1.563 and 1.498 respectively.   [8+3+4]

8. (a) Discuss various nondestructive testing systems which are commonly adopted in industries using ultrasonics.
   (b) Explain different types of scans in Ultrasonic testing.   [7+8]

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