1. (a) Find rank of \[ A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix} \] using Echelon form \[ \text{[7+8]} \]

(b) Solve by Gauss Elimination method \[ 2x+y+z=10, 3x+2y+3z=18, x+4y+9z=16 \]

2. Find Eigen Vectors of \[ A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix} \] \[ \text{[15]} \]

3. Reduce the quadratic form \[ 6x^2 + 3y^2 + 3z^2 - 4yz - 4zx - 2xy \] to canonical form by diagonalization. Also find its nature, rank, signature and index. \[ \text{[15]} \]

4. (a) Compute the real root of the equation \[ 4 \sin x = e^x \] by Bisection method

(b) Find a real root of the equation \[ x \sin x + \cos x = 0 \] near \( x = \pi \) using Newton-Raphson’s method. \[ \text{[8+7]} \]

5. (a) Evaluate \[ \Delta^2 \left[ \frac{5x+6}{x^2+5x+6} \right] \] given that \( h = 1 \)

(b) If \( u_0 = 5, u_1 = 11, u_2 = 40, u_3 = 22, u_4 = 140 \), find \( u_5 \) given that the general term is represented by a fourth degree polynomial. \[ \text{[8+7]} \]

6. (a) The distance travelled by a vehicle at various time intervals during the initial running is given by the following table:

<table>
<thead>
<tr>
<th>Time, t(s)</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance travelled,(km) s(t)</td>
<td>10.0</td>
<td>14.5</td>
<td>19.5</td>
<td>25.5</td>
<td>32.0</td>
</tr>
</tbody>
</table>

Evaluate the velocity of the vehicle at time \( t = 5 \) and 9 seconds.

(b) Evaluate \( \int_0^1 \frac{dx}{1+x} \) by applying the Simpson’s 3/8th Rule by dividing the into six equal parts. Hence deduce an approximate value of \( \log 2 \). \[ \text{[8+7]} \]

7. (a) Solve \( y' = x^2 + y^2 \) subject to the condition \( y(0) = 0 \) for \( x = 0.4 \) by Taylor series method

(b) Solve \( y' = 1 + xy, y(0) = 1 \) by Picard’s method and hence find \( y(0.1), y(0.2) \) \[ \text{[8+7]} \]

8. (a) Fit a power curve \( y = ax^b \) to the following data

<table>
<thead>
<tr>
<th>X</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>7.1</td>
<td>27.8</td>
<td>62.1</td>
<td>110</td>
<td>161</td>
</tr>
</tbody>
</table>
(b) Fit a least square parabola $y = a + bx + cx^2$ to the following data

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>22</td>
<td>38</td>
</tr>
</tbody>
</table>
1. (a) Find rank of \( A = \begin{bmatrix} -1 & 2 & 1 & 8 \\ 2 & 1 & -1 & 0 \\ 3 & 2 & 1 & 7 \end{bmatrix} \) by using Echelon form

(b) Find rank of \( A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \\ 3 & 0 & 5 & -10 \end{bmatrix} \) using Normal Form \([7+8]\)

2. Verify Cayley–Hamilton theorem and find \( A^{-1} \) if \( A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix} \) \([15]\)

3. Find the nature of the quadratic form \( 2x^2 + 4xy + y^2 + 3yz + 4z^2 \) \([15]\)

4. (a) Find a real root of the equation \( x^3 + 3x^2 - 12x - 11 = 0 \) near \(-1\) using Newton–Raphson’s method.

(b) Compute the real root of the equation \( x \sin x = 1 \) by Iteration method. \([8+7]\)

5. The following table gives the population of a town during the last six censuses. Estimate, using Newton’s interpolation formula, the increase in the population during the period 1986 to 1988.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1911</td>
<td>12</td>
</tr>
<tr>
<td>1921</td>
<td>15</td>
</tr>
<tr>
<td>1931</td>
<td>20</td>
</tr>
<tr>
<td>1941</td>
<td>27</td>
</tr>
<tr>
<td>1951</td>
<td>39</td>
</tr>
</tbody>
</table>
| 1961 | 52                        | \([15]\)

6. (a) From the following data find \( f'(0) \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>43</td>
<td>40</td>
<td>38</td>
<td>42</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>

(b) By considering 4 strips, find the value of \( \int_{3}^{7} x^2 \log x \, dx \) \([8+7]\)

7. (a) Solve \( y' = x^2 y - 1, \ y(0) = 1 \) by Taylor series method and hence find \( y \) at \( x = 0.1 \)

(b) Solve \( y' = y, \ y(0) = 1 \) by Picard’s method and compare the solution with exact solution. \([8+7]\)
8. (a) Determine the constants a and b such that \( y = ab^x \) to the following data by the method of least squares

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>4</td>
<td>3</td>
<td>4.243</td>
<td>5.196</td>
<td>6</td>
<td>6.708</td>
</tr>
</tbody>
</table>

(b) Fit a least square parabola \( y = a + bx + cx^2 \) to the following data

<table>
<thead>
<tr>
<th>x</th>
<th>1</th>
<th>1.5</th>
<th>2</th>
<th>2.5</th>
<th>3</th>
<th>3.5</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>1.1</td>
<td>1.3</td>
<td>1.6</td>
<td>2</td>
<td>2.7</td>
<td>3.4</td>
<td>4.1</td>
</tr>
</tbody>
</table>

[7+8]

*****
1. (a) Find rank using Normal Form 
\[ A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix} \]
(b) Solve Homogeneous equations
\[ x_1 + 2x_2 + 3x_3 = 0, \quad 2x_1 + 3x_2 + x_3 = 0, \quad 4x_1 + 5x_2 + 4x_3 = 0 \]
\[ X_1 + x_2 - 2x_3 = 0 \]

2. Find Eigen vectors of 
\[ A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix} \]

3. Reduce the quadratic form 
\[ 3x^2 - 2y^2 - z^2 - 4xy + 12yz - 8zx \]
to canonical form by orthogonal transformation. Also find its nature, rank index signature and the transformation which transforms quadratic form to canonical form.

4. (a) Compute the real root of the equation 
\[ x \sin x = 1 \]
by iteration method.
(b) Find the real root of the equation 
\[ \cos x = x^2 \]
by Newton’s method.

5. (a) If the interval of differencing is unity, prove the following:
(i) \[ \Delta \left( \frac{x^2}{x!} \right) = \frac{2x(1-x)}{(x+1)!} \]
(ii) \[ \Delta \left( \tan^{-1} \left( \frac{n-1}{n} \right) \right) = \tan^{-1} \left( \frac{1}{2n} \right) \]
(b) Using the Newton’s forward differences formula, find the interpolating polynomial for the function \( y = f(x) \) given by \( f(0) = 1, f(1) = 2, f(2) = 1, f(3) = 10 \). Hence evaluate \( f(0.75) \) and \( f(-0.5) \).

6. (a) Find the value of \( \cos(1.74) \) from the following table.

<table>
<thead>
<tr>
<th>X</th>
<th>1.7</th>
<th>1.74</th>
<th>1.78</th>
<th>1.82</th>
<th>1.86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sin x</td>
<td>0.9857</td>
<td>0.9916</td>
<td>0.9781</td>
<td>0.9691</td>
<td>0.9584</td>
</tr>
</tbody>
</table>

(b) Evaluate \( \int_{4}^{5.2} \log x \, dx \) using Simpson’s 3/8th Rule with the aid of the following Table.

<table>
<thead>
<tr>
<th>x</th>
<th>4.0</th>
<th>4.2</th>
<th>4.4</th>
<th>4.6</th>
<th>4.8</th>
<th>5.0</th>
<th>5.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>log x</td>
<td>1.3863</td>
<td>1.4351</td>
<td>1.4816</td>
<td>1.5261</td>
<td>1.5686</td>
<td>1.6094</td>
<td>1.6487</td>
</tr>
</tbody>
</table>
7. (a) Given \( \frac{dy}{dx} = \frac{x^2}{x^2+1} \) with \( y(0)=0 \) use Picard’s method second approximation to obtain \( y \) and find \( y(1) \)
(b) Solve \( y' = xy+y^2 \), \( y(0)=1 \) by R-K method fourth order and hence find \( y(0.1), y(0.2) \) \[8+7\]

8. (a) Fit a second degree polynomial to the following data by the method of least squares

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>1</td>
<td>1.8</td>
<td>1.3</td>
<td>2.5</td>
<td>6.3</td>
</tr>
</tbody>
</table>

(b) Fit a straight line of the form \( y = a + bx \) to the following data

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>12</td>
<td>15</td>
<td>17</td>
<td>22</td>
<td>24</td>
<td>30</td>
</tr>
</tbody>
</table>

\[8+7\]
I B.Tech II Semester Supplementary Examinations, February 2013
MATHEMATICAL METHODS

Time: 3 hours
Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Using Echelon form, find rank of
\[ A = \begin{bmatrix}
1 & 2 & 1 & 0 \\
-2 & 4 & 3 & 0 \\
1 & 0 & 2 & 8
\end{bmatrix} \]

(b) Solve system of equations \( x+y+z=3 \), \( 2x+3y+2z=7 \), \( 4x+2y+3z=9 \) \[7+8\]

2. Verify Cayley – Hamilton theorem and find \( A^{-1} \) if
\[ A = \begin{bmatrix}
1 & 2 & 3 \\
2 & -1 & 4 \\
3 & 1 & -1
\end{bmatrix} \] \[15\]

3. Find the nature of the quadratic form
\[ 2x^2 + 4xy + y^2 + 3yz + 4z^2 \] \[15\]

4. (a) Find a real root the equation \( 1 + \tan^{-1}(x) - x = 0 \) near \( x=1 \) correct up to 4 decimal places using iteration method

(b) By using bisection method find an approximate root of the equation \( \sin x = \frac{1}{x} \) that lies between \( x=1 \) and \( x=1.5 \) (measured in radians). Carryout computation up to 7th stage. \[8+7\]

5. (a) Interpolate by means of Gauss’s backward formula the sales of a concern for the year 1976 for the given data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales (in lakhs of Rs.)</td>
<td>17</td>
<td>20</td>
<td>27</td>
<td>32</td>
<td>36</td>
<td>38</td>
</tr>
</tbody>
</table>

(b) Calculate \( f (1.30) \) from the following table.

<table>
<thead>
<tr>
<th>X:</th>
<th>0.0</th>
<th>1.2</th>
<th>2.4</th>
<th>3.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>F(x):</td>
<td>3.41</td>
<td>2.68</td>
<td>1.37</td>
<td>-1.18</td>
</tr>
</tbody>
</table>

[8+7]

6. (a) The velocity \( v \) of a particle moving in a straight line covers a distance at time \( t \). They are related as shown in the following Table. Find \( v (x) \) at \( x=10 \) and \( x=15 \).

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>v</td>
<td>45</td>
<td>60</td>
<td>65</td>
<td>54</td>
<td>42</td>
</tr>
</tbody>
</table>

(b) Find the area bounded by the curve \( y = x^3 - x + 1 \), \( x - \) axis between \( x=0 \) and \( x=1.2 \) by using
(i) Trapezoidal Rule (ii) Simpson’ 1/3 rule. \[8+7\]
7. (a) Solve \( y' = x^2 + y \), \( y(0) = 1 \) by modified Euler’s method and find \( y(0.02) \), \( y(0.04) \)
(b) Solve \( y' + y = 0 \), \( y(0) = 1 \) by R-K method and hence find \( y(0.1) \), \( y(0.2) \) [8+7]

8. (a) Fit a curve of the type \( y = ae^{bx} \) to the data by the method of least squares

\[
\begin{array}{c|c|c|c|c|c}
 x & 77 & 100 & 185 & 239 & 285 \\
 y & 2.4 & 3.4 & 7 & 11.1 & 19.6 \\
\end{array}
\]

(b) Fit a curve of the type \( y = ab^x \) to the following data by the method of least squares

\[
\begin{array}{c|c|c|c|c|c|c|c}
 x & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\
 y & 10 & 21 & 35 & 59 & 92 & 200 & 400 & 610 \\
\end{array}
\]

[7+8]

*****
I B.Tech I Semester Regular Examinations, February 2013
ENGLISH-I
(Common to Civil Engineering, Electrical & Electronics Engineering,
Mechanical Engineering, Electronics & Communication Engineering,
Computer Science & Engineering, Chemical Engineering, Electronics &
Instrumentation Engineering, Information Technology, Electronics &
Computer Engineering, Aeronautical Engineering, Automobile Engineering,
Mining and Petroleum Technology)

Time: 3 hours Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) “Let every youth take a leaf out of my book and make it a point to account
for everything that comes into and goes out of his pocket, and like me he is
sure to be a gainer in the end.” What lessons in Economics did you learn from
Gandhiji’s stay in London?
(b) Give the synonyms of the following.
   (i) Tryst (ii) misery (iii) dedication (iv) dreary (v) preliminary [10+5]

2. (a) People ought to be as sensible on the subject of money-getting as on any other
subject.” Elucidate Barnum’s advice with suitable examples.
(b) Give the antonyms of the following.
   (i) irrigate (ii) excellent (iii) income (iv) surplus (v) vicious [10+5]

3. (a) Sketch the personality of Edward Middleton as he emerges from the conver-
sation in the play Drunkard.
(b) Describe a trip you and your classmates planned recently and give the details. [10+5]

4. (a) “I can best illustrate by imagining what I should most like to see if I were
given the use of eyes, say, for just three days.” What did Helen Keller imagine
to see?
(b) Write a dialogue between two friends preparing for their viva voce.  [10+5]

5. (a) Discuss the skills of problem solving.
(b) Correct the following sentences
   (i) He is a MLA.
   (ii) Sun rises in the east.
   (iii) I will go Bombay tomorrow.
   (iv) All child are innocent.
   (v) I am believing you.  [10+5]

6. (a) Write about all important details that one needs to keep in mind while trav-
elling alone for the first time.
(b) Correct the following sentences.
(i) I ordered for tea.
(ii) I and he finished the work.
(iii) Honey taste sweet.
(iv) She said that she is going to college.
(v) He is my cousin brother.

7. (a) Expand the line ‘Man proposes, God disposes’ into a paragraph.
(b) Rewrite as directed. (nouns/pronouns/adjectives/adverbs/gerunds)
(i) forgetful- change the adjective into a noun and make a new sentence.
(ii) I and you must attend the meeting. (Order of the pronoun)
(iii) They alway walk quickly. (Pick the adverb)
(iv) Swimming is good for health. (pick the gerund)
(v) She is black but very kind. (Pick the adjectives)

8. (I) Write the one word substitutes for the following phrases

(a) One who knows everything
(b) A place where orphans live
(c) The quality of being simple
(d) A business/organization owned equally by all the people working there
(e) Available or belonging only to particular people and not shared
(f) One who knows many languages

(II) Tick the right answer

(a) people: home:: eagles: _________ (i) tree (ii) cliff (iii) aerie (iv) sky
(b) elephant: mammal:: gecko: _________ (i) Aves (ii) Pisces (iii) Reptiles (iv) Amphibians
(c) calm: sedate:: lazy: _________ (i) indolent (ii) smart (iii) quick (iv) clever
(d) optimist: pessimist:: melancholic: _________ (i) opportunist (ii) enthusiastic (iii) gloomy (iv) cheerful
(e) huts: cluster:: stars: _________ (i) constellation (ii) fleet (iii) group (iv) sky
(f) barometer: pressure:: anemometry: _________ (i) animal speed (ii) bird speed (iii) wind speed (iv) water speed

(III) What are participle forms? Give three functions of participles with examples.

***
1. (a) What were the circumstances that made Gandhiji realize that it was not necessary to imitate others?
   (b) Give the Synonyms of the following.
   (i) Seldom (ii) gorgeous (iii) neglect (iv) surplus (v) equal [10+5]

2. (a) Sum up Barnum’s ‘warnings’ to men and women regarding social pressures
   (b) Give the Antonyms of the following.
   (i) Hasty (ii) coward (iii) miserable (iv) surplus (v) hospitable [10+5]

3. (a) Who is the hero of the play The Drunkard? Give reasons to support your answer.
   (b) Discuss at least three social problems women face in India as outlined in your chapter entitled “Gender.” [10+5]

4. (a) What does Helen Keller want to do if she gets eye sight for three days?
   (b) Write a dialogue between a receptionist and a customer at a hotel. [10+5]

5. (a) How does travel develop national integration among people?
   (b) Fill in the blanks with suitable verb forms
   (i) The students———- in after the bell ———. (come, ring)
   (ii) Hema ——— her home work yet. (not, finish)
   (iii) Ram usually ——— coffee at 7 a.m. (take)
   (iv) The Prime Minister ——— Hyderabad soon. (visit) [10+5]

6. (a) Develop a dialogue. Discuss with your friend about the impact of movies on youth.
   (b) Rewrite as directed
   (i) Due to severe cyclone large trees fell to the ground. Shelter less people laid the blame squarely on the reckless authorities. (pick up adjectives and adverbs)
   (ii) I, Pradeep and you must attend my wedding. (order of the pronoun)
   (iii) Reading improves our speaking skill. (pick up the gerund) [10+5]
7. (a) Write an essay on “Women are good managers”
   (b) Identify the types of sentences and make a similar sentence for each type.
      (i) Are you joking?
      (ii) He is a genius!
      (iii) I am on my way.
      (iv) Hold the parcel carefully.
      (v) Mind your head!

8. (I) Write the one word substitutes for the following phrases
   (i) One who knows everything
   (ii) A place where orphans live
   (iii) The quality of being simple
   (vi) A business/organization owned equally by all the people working there
   (v) Available or belonging only to particular people and not shared
   (vi) One who knows many languages

   (II) Tick the right answer
   (i) people: home :: eagles: ______
        (a)tree  (b)cliff  (c)aerie  (d)sky
   (ii) elephant: mammal :: gecko: ______
        (a)Aves  (b) Pisces  (c)Reptiles  (d)Amphibians
   (iii) calm: sedate :: lazy: ______
        (a)indolent  (b)smart  (c)quick  (d)clever
   (iv) optimist: pessimist :: melancholic: ______
        (a)opportunist  (b)enthusiastic  (c)gloomy  (d)cheerful
   (v) huts: cluster :: stars: ______
        (a) constellations  (b) fleet  (c)group  (d)sky
   (vi) barometer: pressure :: anemometer: ______
        (a) animal speed  (b) bird speed  (c) wind speed  (d) water speed

   (III) What are participle forms? Give three functions of participles with examples.

   ★★★★★
I B.Tech I Semester Regular Examinations, February 2013
ENGLISH-I
( Common to Civil Engineering, Electrical & Electronics Engineering,
Mechanical Engineering, Electronics & Communication Engineering,
Computer Science & Engineering, Chemical Engineering, Electronics &
Instrumentation Engineering, Information Technology, Electronics &
Computer Engineering, Aeronautical Engineering, Automobile Engineering,
Mining and Petroleum Technology)

Time: 3 hours Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Do you think that Gandhiji gained in many ways by reducing his expenses in
London? Would like to follow him?
(b) Give the Synonyms of the following:
   (i) Melancholy (ii) Initiated (iii) Vicious (iv) Mores (v) Gorgeous [10+5]

2. (a) Write about “Problem Solving Skills”.
(b) Give the ANTONYMS of the following.
   (i)Hospitality (ii) Transmit (iii) Influence (iv) Tedium (v) Solemn [10+5]

3. (a) Describe in your own words the effort made by Gandhi to transform himself
into an English gentleman.
(b) Expand the line ‘Man proposes, God disposes’ into a paragraph [10+5]

4. (a) What do you know about Personal Presentation Skills? Explain.
(b) Madhu plans to absent himself from College for a few days and go to watch
a cricket match. Karan dissuades him from doing so. Develop a dialogue.
[10+5]

5. (a) Write an argumentative essay on “English communication skills are necessary
to get a good job in India”.
(b) Fill in the blanks with suitable verb forms that are given in the brackets
   (i) Srinu ——— (see) an accident while he ——— (come) to college
   (ii) He ——— (enter) the room and the power———off (go)
   (iii) ———(find) unity in diversity everywhere in India [10+5]

6. (a) What is Helen Keller’s message to people regarding the use of senses.
(b) Give synonyms of the following:
   (i) Seldom (ii) Mighty (iii) Emphasize (iv) Brutal (v) Obsolete [10+5]

7. (a) Expand the following lines into two or three paragraphs each by giving apt
examples.
   (i) ‘God sees the truth but waits’
   (ii) ‘Flattery is the fool’s food’
(b) Rewrite as directed (nouns /pronouns/adjectives/adverbs/gerunds)
(i) Species—Give the plural form of the noun and make a sentence with it.
(ii) That bird built a nest (supply the reflexive pronoun to the noun given in italics)
(iii) I think those bananas are rotten. (Pick the adjectives)
(iv) Reading improves your speaking skill. (Pick the gerund)
(v) He ran so fast that none could catch him. (Pick the adverb/s) [10+5]

8. (a) Give the one word substitutes of the following.
(i) A book published after the death of its author.
(ii) One who loves and helps mankind.
(iii) People who work together.
(iv) To write under a different name.
(v) A place where birds are kept.
(vi) A Government by the rich.

(b) Match each word in Column A with its antonym in column B.
A       B
1. Extravagant    expected
2. Income         awful
3. Unforeseen     natural
4. Excellent      restrained
5. Surplus        expenditure
6. Imitation      deficit

(c) Write 2 words for each of the following prefixes.
(i) dis- (ii) Under- (iii) Inter- [6+6+3]

*****
1. (a) Summarise Gandhi’s experiences as a student in London?
    (b) Give the synonyms of the following.
        (i) Tryst (ii) Heritage (iii) Eradication (iv) Emulate (v) pecuniary [10+5]

2. (a) What kind of people according to Barnaum can attain pecuniary Independence?
    (b) Give the Antonyms of the following.
        (i) Conscious (ii) often (iii) dreary (iv) Vulnerable (v) logical [10+5]

3. (a) What are the advantages and disadvantages of train journey in comparison with other modes of transport?
    (b) Describe the picnic spot you have visited recently. [10+5]

4. (a) Enumerate Keller’s plans for her third and last day of “vision”.
    (b) Fill in the blanks with suitable verb forms.
        (i) Meera and Tom ___ (be) good students.
        (ii) I ___ (study) physics for five years.
        (iii) I am sure he ___ (win) the match.
        (iv) Every Sunday Rosie ___ (go) to church.
        (v) She ___ (suffer) from malaria since last month. [10+5]

5. (a) Plan a short trip to a wild life sanctuary with your class mates. Choose a suitable destination; determine a set of rules to be followed during the trip; indicate the budget, travel plans, accommodation, things to carry and sharing of responsibilities.
    (b) Fill in the blanks with suitable verb forms.
        (i) have you ___ (ring) the theatre to book the tickets?
        (ii) That winter, the river ___ (freeze) for the first time in ten years.
        (iii) She denied ___ (take) the money.
        (iv) He ___ (learn) English for several years.
        (v) I ___ (wear) a green hat during the part tomorrow. [10+5]
6. (a) You have gone on an excursion with your group, and the bus breaks down on your way back to college. It is quite late and you and your friends might have to find a place to stay for the night, if you do not find a mechanic to repair the bus soon. Write 250-300 words on how you will deal with the situation while staying calm, and maintaining your sense of humour.

(b) Correct the following sentences.
   (i) My brother is a teacher and I am businessman.
   (ii) There isn’t much people at the bus stop.
   (iii) Kiran will absent for the meeting as he was not in town
   (iv) He bought three breads from the bakery.
   (v) Keep your city cleanly and greenly.

7. (a) Expand the line into a paragraph. ‘Knowledge is Power’.

(b) Rewrite as directed.
   (i) The fire is glowing very warmly. (Pick the adverbs and write them in your answer sheet).
   (ii) Listening improves your writing ability. (Pick the gerund and write it in your answer sheet).
   (iii) Rani is not only rich but also intelligent. (Pick the adjectives and write them in your answer sheet).
   (iv) Exploit— change the noun into an adjective and make a sentence of your own.
   (v) I, Suresh and you must write the essay again. (Use the order of the pronoun).

8. (a) Give the one word substitutes of the following.
   (i) A person who loves books.
   (ii) One who copies from other writers.
   (iii) A game in which no one wins.
   (iv) A thing no longer in use.
   (v) People living at the same time.
   (vi) Fear of open places.

(b) Pick out the odd word out.
   (i) callous, benign, cruel, malevolent
   (ii) Sincere, hypocritical, deceitful, lying
   (iii) Dreary, interesting, laborious, tedious
   (iv) Mourn, lament, bewail, remember
   (v) Surreptitious, clandestine, covert, overt
   (vi) Horse, stable, cow, pig

(c) Write the difference between the usage of Present Perfect and Simple Past tense and give examples.

***
1. (a) Solve \( dy + (2\cot x + \sin 2x)dx = 0 \)
(b) Find the orthogonal trajectory of the family of curves \( 2xy + y^2 - x^2 = a \), where 'a' is a parameter \([8+7]\)

2. (a) Explain the procedure to find Complete solution of second order non homogeneous differential equation with constant coefficients.
(b) Solve \( (D^2 - 4)y = x \sin \lambda x \) \([8+7]\)

3. (a) Find the dimensions of a open rectangular tank of maximum capacity whose surface area is 54 square feet.
(b) In a right angled triangle ABC with \(^\angle B = 90^\circ\), find the maximum of \( \cos A \cos B \cos C \). \([8+7]\)

4. (a) Trace the curve \( r = 4\theta \).
(b) Trace the curve \( r = \frac{1}{4} + 2\sin \theta \). \([8+7]\)

5. (a) Find the cost of plating of the front portion of the parabolic reflector of an automobile head light of 12cm diameter and 4 cm deep if the cost of plating is Rs. 2.00 per Sq. cm.
(b) Find the volume of the right circular cone of height ‘h’ and base radius ‘r’. \([8+7]\)

6. (a) Evaluate \( \int \int \int_V \, dxdydz \) where \( V \) is the finite region of space formed by the planes \( x=0, y=0, z = 0 & 2x + 3y + 4z = 12 \).
(b) Evaluate \( \int \int_R y \, dxdy \) where \( R \) is the region bounded by the Parabolas \( y^2 = 4x \) and \( x^2 = 4y \). \([8+7]\)

7. (a) Find the directional derivative of \( xyz^2 + xz \) at \((1,1,1)\) in a direction of the normal to the surface \( 3x^2y + y = z \) at \((0,1,1)\).
(b) Show that the vector \( (x^2-yz)\hat{i} - (y^2-zx)\hat{j} + (z^2-xy)\hat{k} \) is irrotational and find its scalar potential. \([8+7]\)
8. (a) If \( f = 4xz i - y^2 j + yzk \), evaluate \( \int_S f.N ds \) where \( S \) is the surface of the cube bounded by \( x = 0, x = a, y = 0, y = a, z = 0, z = a \).

(b) Evaluate by Green’s theorem, \( \oint_C (y - \sin x) \, dx + \cos x \, dy \) where \( C \) is the triangle enclosed by the lines \( x = 0, x = \frac{\pi}{2}, \pi y = 2x \).  

\[ 8+7 \]
1. (a) Solve \((xy \sin xy + \cos xy)y \, dx + (xy \sin xy - \cos xy)x \, dy = 0\)  
    \[8+7\]
    (b) Radium decomposes at a rate proportional to the amount present. If 5% of the original amount disappears in 50 years, how much will remain after 100 years.

2. (a) Solve \((D^2 + 9)y = \sec 3x\)  
    (b) Solve \(\frac{d^2y}{dx^2} + 4y = x \cos x\)  
    \[8+7\]

3. (a) Find Taylor’s series expansion of the \(f(x,y) = \cos x\) about \(x = \frac{\pi}{3}\) and hence find the approximate value of \(\cos 35°\).  
    (b) If \(x = u\sqrt{1-r^2}, y = v\sqrt{1-r^2}, z = w\sqrt{1-r^2}\) such that \(x^2 + y^2 + z^2 = r^2\) then find \(\frac{\partial(u,v,w)}{\partial(x,y,z)}\).  
    \[8+7\]

4. (a) Trace the curve \(r^2 = a^2 \cos 2\theta\).  
    (b) Trace the curve \(x = a(\theta + \sin \theta), y = a(1 + \cos \theta)\).  
    \[8+7\]

5. (a) A man walks along the curve \(20y=3(4x^2-20x+9)\) between the points, \(x=\frac{1}{2}\) and \(x=\frac{9}{2}\) find the distance covered by the man?  
    (b) Find the surface area of the solid generated by the revolution of the astroid \(x^{2/3} + y^{2/3} + z^{2/3} = a^{2/3}\) about the x-axis.  
    \[8+7\]

6. (a) Evaluate \(\int_{0}^{4} \int_{x^2/4}^{y^2/4} \frac{y}{x^2+y^2} \, dx \, dy\).  
    (b) Evaluate \(\int_{0}^{1} \int_{0}^{1-x^2} \int_{0}^{1-x^2-y^2} xyz \, dz \, dy \, dx\).  
    \[8+7\]

7. (a) If \(V = e^{3x^2}(i+j+k)\), find curl \(V\).  
    (b) Find the constants \(a\) and \(b\) so that the surface \(ax^2-byz = (a+2)x\) will be orthogonal to the surface \(4x^2y + z^3 = 4\) at the point \((1,-1,2)\)  
    \[8+7\]

8. (a) Let \(C\) be the curve \(x = 1 - y^2\) from \((0,-1)\) to \((0, 1)\). Evaluate \(\int C y^3 \, dx + x^2 \, dy\)  
    (b) Use Gauss divergence theorem to evaluate \(\int S (yz^2i+zx^2j+2z^2k) \cdot N \, ds\), where \(S\) is the surface bounded by the xy-plane and the upper half of the sphere \(x^2+y^2+z^2=a^2\) above the this plane.  
    \[8+7\]
I B.Tech I Semester Regular Examinations, February 2013
MATHEMATICS-I

Time: 3 hours Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Solve \( x \frac{dy}{dx} + y = x^3 y^6 \)
   
   (b) Find the orthogonal trajectory of the family of curves \( r^2 = a \cos 2\theta \), where 'a' is a parameter [7+8]

2. (a) Solve \((D^2 - 3D + 2)y = e^x\)
   
   (b) Solve \((D^4 - a^4)y = 0\) [8+7]

3. (a) Calculate the approximate value of \( \sqrt{10} \) to four decimal places using Taylor’s theorem.
   
   (b) Find 3 positive numbers whose sum is 600 and whose product is maximum. [8+7]

4. (a) Trace the curve \( r = \frac{3a \sin \theta \cos \theta}{\sin^2 \theta + \cos^2 \theta} \)
   
   (b) Trace the curve \( r = \tan \theta \). [8+7]

5. (a) Find the length of the arc of the semi-cubical parabola \( ay^2 = x^3 \) from the vertex to the ordinate \( x=5a \).
   
   (b) Find the area of the surface of revolution generated by revolving one arc of the curve \( y=\sin x \) about the x-axis. [8+7]

6. (a) Evaluate \( \int \int \frac{r \, dr \, d\theta}{\sqrt{a^2 + r^2}} \) over one loop of the lemniscates \( r^2 = a^2 \cos 2\theta \).
   
   (b) Evaluate the integral \( \int_0^a \int_0^{\pi x-x^2} (1 - x^2 - y^2)^{1/2} \, dx \, dy \) by changing into polar coordinates and hence evaluate it. [8+7]

7. (a) Prove that \( \vec{F} = r^2 \vec{r} \) is conservative and find the scalar potential.
   
   (b) Show if \( \theta \) is the acute angle between the surfaces \( xy^2z = 3x + z^2 \) and \( 3x^2 - y^2 + 2z = 1 \) at the point \((1,-2,1)\), show that \( \cos \theta = \frac{3}{\sqrt{6}} \). [8+7]

8. Verify Green’s theorem for \( \oint_c (xy + y^2) \, dx + x^2 \, dy \) where C is a bounded by \( y=x \) and \( y = x^2 \). [15]

\( \star \star \star \star \)
I B.Tech I Semester Regular Examinations, February 2013
MATHEMATICS-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
Petroleum Technology)

Time: 3 hours Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Solve \( dy + (2y \cot x + \sin 2x)dx = 0 \)
   (b) Find the orthogonal trajectory of the family of curves \( 2xy + y^2 - x^2 = a \), where 'a' is a parameter \[8+7\]

2. (a) Explain the procedure to find Complete solution of second order non homogeneous differential equation with constant coefficients.
   (b) Solve \( (D^2 - 4)y = x \sin \lambda x \) \[8+7\]

3. (a) If \( U = f \left( \frac{y-x}{xy}, \frac{z-x}{xz} \right) \), P.T. \( x^2 \frac{\partial f}{\partial x} + y^2 \frac{\partial f}{\partial y} + z^2 \frac{\partial f}{\partial z} = 0 \).
   (b) Expand \( u = x^y \) in powers of \( (x-1) \) and \( (y-1) \) up to third degree terms. \[8+7\]

4. (a) Trace the curve \( r = \cos 4\theta \).
   (b) Trace the curve \( y^2(1-x) = x^2(1+x) \). \[8+7\]

5. (a) Find the surface area generated by rotating the arc of the catenary \( y = a \cosh x \) from \( x=0 \) to \( a \) about the \( x \)-axis.
   (b) Find the volume of the solid generated by revolving about the \( x \)-axis of the loop of the curve \( y^2 = x^2 \frac{(a+x)}{a-x} \). \[8+7\]

6. (a) Evaluate \( \int \int r \, dr \, d\theta \) over the region bounded by the cardioid \( r=a(1+\cos \theta) \) and out side the circle \( r=a \).
   (b) By transforming into cylindrical coordinates evaluate the integral \( \int \int \int z(x^2 + y^2 + z^2) \, dx \, dy \, dz \) taken over the volume of the cylinder \( x^2 + y^2 = a^2 \) intercepted by the plus \( z=0 \) and \( z=h \). \[8+7\]

7. (a) Find \( \text{div } f \) and \( \text{curl } f \) where \( f = \text{grad}(x^3 + y^3 + z^3 - 3xyz) \)
   (b) Find the angle of intersection at \((4,-3,2)\) of spheres \( x^2 + y^2 + z^2 = 29 \) and \( x^2 + y^2 + z^2 + 4x - 6y - 8z - 47 = 0 \) \[8+7\]

8. Verify Stokes theorem for \( F = (y-z+2)i+(yz+4)j-xk \) where \( S \) is the surface of the cube \( x=0, y=0, z=0, x=2, y=2, z=2 \) above the \( xy \)-plane \[15\]
I B.Tech I Semester Regular Examinations, February 2013
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
Petroleum Technology)

Time: 3 hours Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain young’s double slit experiment.

(b) Derive an expression for wavelength of light in terms of fringe width in interference pattern due to young’s double slit. [7+8]

2. (a) Explain with necessary theory, the Fraunhofer diffraction due to ‘n’ slits.

(b) Calculate the maximum number of orders possible for a plane diffraction grating. [12+3]

3. (a) State and prove malus law.

(b) Write notes on quarter and half wave plates? [8+7]

4. (a) What is Primitive cell? How does it different from unit cell? [3+9+3]

(b) Illustrate the SC, BCC and FCC crystal structures.

(c) Derive the expression for density of the crystal in terms of lattice constant.

5. (a) Explain how the crystal structure will be determined by Powder method?

(b) Calculate distance between two successive parallel planes having miller indices (hkl). [7+8]

6. (a) Write notes on Population inversion and lasing action.

(b) Explain the three main components of any laser system. [6+9]

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 refraction indices of the core and the cladding are 1.563 and 1.498 respectively. [3+8+4]

8. (a) Discuss various non-destructive testing systems which are commonly adopted in industries using ultrasonics.

(b) Describe the ultrasonic flaw detector with suitable diagram. [10+5]

*****
1. (a) Explain the phenomenon of interference.
   (b) What are the necessary conditions for obtaining interference fringes.
   (c) Give the analytical treatment of interference of light and hence obtain the condition for maximum and minimum intensity. [3+4+8]

2. (a) Give the theory of plane transmission grating and deduce the following expression \( \sin \theta = Nn\lambda \). A parallel beam of sodium light is normally incident on a plane transmission grating having 4250 lines per cm and a second order spectral line is observed at an angle of 30\(^0\). Calculate the wave length of light.
   (b) Calculate the maximum number of orders possible with a plane diffraction grating.

3. (a) Distinguish between plane, circularly and elliptically polarized light.
   (b) A beam of linearly polarized light is converted into a circularly polarized light by passing it through a crystal slice of thickness \( 3 \times 10^{-7} \text{cm} \). Calculate the difference in the refractive indices of the two rays inside the crystal assuming the above thickness to be the minimum value required to produce the observed effect. Wavelength of light used is 600nm.

4. (a) What is unit cell? What is primetime cell?
   (b) What are the seven crystal systems and write the relationship between lattice parameters in various crystal systems.
   (c) During its conversion from Iron BCC to FCC decrease of volume is 0.5%. Show that the maximum radius of the sphere that can just fit into the void at the center of FCC structure coordinated by the facial atoms is 0.414\(r\), where \(r\) is the radius of atom. [3+5+7]

5. (a) Discuss Bragg’s law of X-ray diffraction.
   (b) Describe the powder method to determine crystal structure.
   (c) Monochromatic X-rays of wavelength 1.5 A.U. are incident on a crystal face having an interplanar spacing of 1.6 A.U. find the highest order for which Bragg’s reflection maximum can be seen. [4+7+4]
6. (a) Explain the following:
   (i) Life time of an energy level
   (ii) Optical pumping process

   (b) Explain the need of a cavity resonator in a laser.

   (c) With the help of suitable diagrams, explain the principle, construction and
       working of a Ruby laser. \[4+3+8\]

7. (a) Explain the propagation of light rays through optical fibers.

   (b) Explain construction of in optical fibers.

   (c) The refractive indices of the core and cladding of a fiber are 1.54 and 1.5
       respectively. Calculate its numerical aperture and maximum acceptance angle.
       \[4+4+7\]

8. (a) What are Ultrasonic transducers? Write a note on quartz crystal transducer.

   (b) Explain the need of inspection standards in ultrasonic inspection.

   (c) Write a note on couplants used in ultrasonic inspection. \[6+6+3\]
1. (a) Account for the circular shape of ‘Newton’s rings’ in interference pattern.
(b) Obtain the expression for the diameter of the \( n^{th} \) dark ring in the case of Newton’s rings.
(c) In Newton’s rings experiment, the diameters of the 5\(^{th}\) and 25\(^{th}\) rings are 0.3cm and 0.8cm respectively. If the radius of curvature of the plano-convex lens is 10cm, find the wavelength of the incident light.  
\[5+6+4\]

2. (a) Explain what is meant by diffraction of light. How diffraction is different from interference?
(b) Discuss Fraunhofer single slit diffraction. Draw intensity distribution curves and give conditions for bright and dark fringes in single slit diffraction pattern.  
\[5+10\]

3. (a) Define double refraction. Describe double refraction in calcite crystal to produce polarized light.
(b) What are uniaxial and biaxial crystals (or) positive and negative crystals? Give examples. Distinguish between them.  
\[6+9\]

4. (a) Illustrate the Face Centre Cubic crystal structure.
(b) Find the Coordination Number, Nearest Neighbour Distance, Atomic Radius and Packing Fraction for FCC lattice.
(c) Is unit cell of FCC lattice a primitive or not? Why?  
\[4+9+2\]

5. (a) Explain how the crystal structure will be determined by Powder method?
(b) Calculate distance between two successive parallel planes having miller indices (hkl).  
\[7+8\]

6. (a) Explain the purpose of an active medium in a laser.
(b) With the help of suitable diagram, explain the principle, construction and working of a He-Ne laser.
(c) Calculate the wavelength of emitted radiation from GaAs which has a band gap of 1.44 ev. [2+9+6]

7. (a) Define fractional index change. How is it related with Numerical Aperture.
(b) Write notes on Attenuation losses in optical fiber.
(c) Calculate the fractional index change for a given optical fiber. If the refractive indices of the core and cladding are 1.563 and 1.498. [5+5+5]

8. (a) Explain longitudinal and transverse modes of wave propagation. [7+8]
(b) Explain the calibration and inspection standards in Ultrasonic flaw detection.

*****
1. (a) Define interference of light.
   (b) Derive an expression for fringe width in interference pattern and show that the fringes are uniformly spaced with relevant ray diagram.
   (c) Two slits separated by a distance of 0.2mm are illuminated by a monochromatic light of wavelength 550nm. Calculate the fringe width on a screen at distance of 1m from the slits. [2+9+4]

2. (a) Discuss in detail Fraunhofer diffractions due to double slit.
   (b) Write notes in missing of orders in the double slit diffraction pattern. [8+7]

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) Illustrate or compare SC, BCC and FCC crystal structures.
   (b) Estimate the packing fractions of FCC crystal
   (c) Copper has FCC structure and its atomic radius is 0.1278 nm. Calculate its density. Take the atomic weight of copper as 63.5 amu. [5+5+5]

5. (a) State and explain Bragg’s law.
   (b) Explain how the X-ray diffraction can be employed to determine the crystal structure.
   (c) Find the ratio of inter planar distances of (100), (110) and (111) planes for a simple cubic structure. [5+6+4]

6. (a) Explain the three Einstein’s coefficients.
   (b) Describe the construction and working of Helium – Neon laser [6+9]

7. (a) Explain Acceptance angle and derive expression for it.
   (b) Write notes on Step Index and Graded Index fibers.
(c) For an optical fiber fractional index change is 0.14 and refractive index of cladding is 1.3. Calculate refractive index of core. [5+6+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]

*****
1. (a) State the law of chemical equilibrium. How can it be derived on thermodynamic considerations?
   (b) What are various types of semi permeable membranes used in reverse osmosis process and what are their limitations? [8+7]

2. (a) How temperature, pressure and impurities influence the viscosity
   (b) Explain how viscosity method is useful to determine the molecular weight of polymers. [8+7]

3. (a) What is meant by interference and what are the interferences observed during working with ion selective electrodes.
   (b) Discuss important differences between photochemical and thermo chemical reactions? [8+7]

4. (a) What is super conductivity? Explain the phenomenon of super conductivity? Discuss its applications
   (b) Write any four differences between p-type and n-type semiconductors. [8+7]

5. (a) What are energy sources?
   (b) Write a short note on
   (i) Conventional energy sources (ii) Non conventional energy sources [7+8]

6. (a) Write a short note on batteries
   (b) Discuss the working principle of primary batteries? [7+8]

7. (a) Explain origin of solar energy and stellar energy.
   (b) Explain the principles and reactions in Atom bomb and Hydrogen bomb. [7+8]

8. (a) Write notes on photo voltaic power plant.
   (b) Write about solar thermal power plant. [8+7]
Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is Joule Thomson coefficient and why it is zero for an ideal gas?
   (b) What is meant by solubility product of a sparingly soluble salt? How is solubility product determined by conductivity measurements? [8+7]

2. (a) What are enzyme reactions? Explain with examples.
   (b) Write a short note on promoters and inhibitors. [8+7]

3. (a) Predict the number signal in $^1$H-NMR spectrum for the following compounds
   (i) CH$_3$CH$_2$OH  (ii) CH$_3$CH$_2$Cl  (iii) CH$_3$-O-CH$_3$
   (b) State and explain Beers-Lamberts law [9+6]

4. (a) What is storage device? Explain primary and secondary storage devices.
   (b) What are thermo tropic, lyotropic liquid crystals? Explain [9+6]

5. (a) Explain the following terms?
   (i) Condensor  (ii) Cooling towers
   (b) Explain the following terms?
   (i) super heater  (ii) Reheater  (iii) Air preheater [7+8]

6. (a) Explain the construction and working of Dry or laclanche cell?
   (b) Distinguish between a cell and a battery. Give the classification of working of cells with examples? [8+7]

7. (a) Discuss the importance of binding energy curve in the release of nuclear energy.
   (b) Calculate the binding energy of deuteron nucleus, given that mass of neutron = 1.0087 amu, mass of proton = 1.0078 amu and mass of deuteron nucleus = 2.0141 amu. (Ans: 2.22 Mev) [8+7]

8. (a) Write about non-concentrating and concentrating solar collectors.
   (b) How green house effect is useful to mankind. [8+7]
Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is solubility product of a salt? Explain with an example how the solubility of an ionic substance can be found if its solubility product value is known.
(b) What is Joule Thomson effect? Derive the expression for JT coefficient. [8+7]

2. (a) What are Protective colloids and what is their significance?
(b) Write a short note on colloidal solution and micelles. [8+7]

3. (a) What are the important differences between Fluorescence and Phosphorescence?
(b) Write short note on ion selective electrode
(c) Discuss the engineering applications of NMR spectroscopy. [6+4+5]

4. (a) Explain the working mechanism of LCD.
(b) Superconductors are powerful engineering devices. How can you justify it?
(c) Discuss various chemical components used in storage devices? Explain primary and secondary storage devices. [5+5+5]

5. (a) Write a note on Otto Hoffmans by – product oven process?
(b) Mention the Recovery of bye – products in the above process? [8+7]

6. (a) What is emf. write a note on Redox reactions.
(b) What are the differences between oxidation & reduction half reactions? [7+8]

7. Complete the following equations and identify X, Y, Z, Q and R. [5x3=15]
   (a) \( ^{24}_{11}Na \rightarrow X + _{-1}^0e \)  
   (b) \( ^{24}_{11}Na + _{1}^0n \rightarrow ^{14}_{7}Y + _{1}^1Z \)
   (c) \( ^{27}_{14}Si \rightarrow ^{27}_{13}Q + _{1}^0e \)  
   (d) \( R + _{4}^2He \rightarrow ^{13}_{7}N + _{1}^0n \)  
   (e) \( ^{30}_{15}P \rightarrow ^{30}_{14}Si + ...... \)

8. (a) What is solar energy? How is it harnessed?
(b) How does solar energy can be converted into electricity? [7+8]
1. (a) Explain the terms osmosis and reverse osmosis.
   (b) Describe the process of desalination using the principle of reverse osmosis. [8+7]

2. (a) What are Protective colloids and what is their significance?
   (b) Write a short note on colloidal solution and micelles. [8+7]

3. (a) What are the important differences between Fluorescence and Phosphorescence?
   (b) Write short note on ion selective electrode
   (c) Discuss the engineering applications of NMR spectroscopy. [6+4+5]

4. (a) Explain the principle of photocopying process by using selenium photoconductor
   (b) What are the important features of
      (i) Stoichiometric semiconducting materials and
      (ii) Controlled valency semiconducting materials? [7+8]

5. Write a short note on the following
   (a) Calorific value   (b) Gross calorific value   (c) Net calorific value. [15]

6. Derive Nernst’s equation for single electrode potential and explain the terms involved in it. Write its applications [15]

7. (a) What is conversion factor? How does it determine the self maintenance of a nuclear reactor? How fissionable U\(^{235}\) is obtained?
   (b) Describe the various disposal methods of nuclear wastes. [8+7]

8. (a) Define solar constant. Give its value on the upper atmosphere and on the lower atmosphere.
   (b) How are solar energy devices are classified? Explain.
   (c) What is the use of plane mirror of a box type of solar cooker? [5+5+5]


1 of 1
C PROGRAMMING

Time: 3 hours Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is an expression in C? Explain about various types of expressions in C.
   (b) Give C notation for the following mathematical expressions
      (i) \( 1 + \frac{n}{1} + \frac{n(n-1)x^2}{2} + \frac{n(n-1)(n-2)x^3}{2} \)
      (ii) \( \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \)  

2. (a) What is null? Justify your answer with an example
    (b) Write a C program to find the biggest of 3 numbers

3. (a) Write C program to evaluate the Sin function
      \( \text{Sin}(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots \ldots \)
    (b) Write C Program to evaluate Cos Function
        \( \text{Cos}(X) = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \ldots \ldots \)

4. Can an array be passed from a function to the calling portion of a program via return statement? Explain

5. (a) Explain in detail about various ‘MATH’ – Functions with C – Programs as examples.
    (b) Write in detail about ‘Tips and Common Programming Errors’ in Functions with examples.

6. (a) Explain the concept of Dynamic Storage and Arrays.
    (b) Write a C Program to implement Dynamic Storage of One – Dimensional arrays i.e., to read the elements and Print the elements.

7. (a) Differentiate between self referential and nested structures with an example.
    (b) What is the difference between array of structures and structures containing arrays with suitable examples

8. Write a program to merge the contents from File A and File B and displays its content in a File C.
I B.Tech I Semester Regular Examinations, February 2013
C PROGRAMMING

Time: 3 hours
Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. What is Problem Solving? Explain about various Problem Solving Techniques with examples [15]

2. (a) Write syntax for different forms of if and if else statements.
    (b) Write a C program to find the biggest among given 4 numbers (use nested if else). [8+7]

3. (a) Write C program reverse of a given string without strrev() function?
    (b) Write C program concatenation of given two strings without strcat( ) function? [8+7]

4. (a) Define Multi dimensional array. Explain its usage by writing a program.
    (b) Explain the applications of arrays. [8+7]

5. (a) Why we say the life of global variable is retained throughout the program explain.
    (b) Write a program to explain function as an argument. [8+7]

6. (a) Write a C program that uses a pointer as a function argument.
    (b) Write a C Program using Pointer for string Comparison. [7+8]

7. (a) What is the difference between structures and arrays in C.
    (b) Explain the difference between structures and unions [8+7]

8. Write a program to demonstrate
    (a)getc() and putc ()
    (b) gets() and puts () [8+7]

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1. What are constants in C? Explain about various constants used in C  

2. Differentiate the conditional operator with if else statement. Explain with appropriate examples  

3. (a) Write C program to delete all occurrences of vowels in given text?  
   (b) Write a C program to copy the one string to another string without strcpy( ) function?  

4. (a) Write the program to find the sum of N natural numbers using arrays.  
   (b) Write a program to perform subtraction of two matrices.  

5. (a) Define Actual Parameters and Formal Parameter. What is meant by Global and Local variable? Explain with an example. 
   (b) Write a C program to find sum of given series by using Function with argument and return value $e = 2 + 3/1! - 6/2! + 9/3! - 12/4! + \ldots \ldots \ldots \ldots$  

6. Write a C Program to implement Two Dimensional Array (Matrix) Multiplication using Pointers. Check the condition of Matrix Multiplication.  

7. What is nested structure. Give the syntax. Explain with an example  

8. Write a program that reads a file and creates a new file with the same data, except reverse the case on the second file. Everywhere uppercase letters appear in the first file, write lower-case letters to the new file, and everywhere lowercase letters appear in the first file, and write uppercase letters to the new file.  

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I B.Tech I Semester Regular Examinations, February 2013
C PROGRAMMING

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

1. (a) What is an algorithm? List and explain the properties of algorithm.
   (b) List the advantages of algorithm. Write an algorithm to find the average of 3 numbers [8+7]

2. What are bitwise logical operators? Explain about bitwise logical operators with suitable programming example. [15]

3. (a) Suppose a break statement is included within the innermost of several nested control Statements. What happens when break statement is executed?
   (b) Write a program to print the multiplication table up to with proper format? [8+7]

4. (a) Write the program to find the sum of N natural numbers using arrays.
   (b) Write a program to perform subtraction of two matrices. [6+9]

5. (a) Explain in detail about various ‘MATH’ – Functions with C – Programs as examples.
   (b) Write in detail about ‘Tips and Common Programming Errors’ in Functions with examples. [8+7]

6. (a) Explain the concept of Dynamic Storage of Character Strings.
   (b) Write a C Program to implement Copying a String into another String using Dynamic Storage Concept of Pointers. [7+8]

7. (a) Write the syntax for defining nested structure.
   (b) Write a program to read and write employee details using nested structure. [6+9]

8. Suppose a file contains employee’s records with each record containing name, designation and salary of an employee. Write a program to read these records and display them in sorted order by name. [15]

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