Q-1 Attempt any ten following multiple choice problems.

1) The solution of $\frac{dy}{dx} = e^{x+y}$ is ____
   A. $e^x + e^y = c$  B. $e^x + e^{-y} = c$  C. $e^x - e^y = c$  D. None

2) If $y_1 = e^{3x}$ and $y_2 = xe^{3x}$ then Wronskian, $W =$ ____
   A. $e^{2x}$  B. $e^{-x}$  C. $e^{6x}$  D. None

3) The order and degree of the differential equation $\frac{d^3y}{dx^3} + 3 \left( \frac{dy}{dx} \right)^2 = x \log \left( \frac{dy}{dx} \right)$ is ____
   A. 3 and 1  B. 2 and 1  C. 3 and 2  D. None

4) If $y = \cos(2x - y)$ then $Dy =$ _______
   A. $\sin(2x - y)$  B. $-\sin(2x - y)$  C. $-2\sin(2x - y)$  D. None

5) $L(e^{2t+3}) =$ _____
   A. $\frac{e^2}{s-2}$  B. $\frac{e^2}{s-3}$  C. $\frac{1}{s-\log 2}$  D. $\frac{1}{s-2}$

6) $L^{-1}\left( \frac{1}{(s+4)^6} \right) =$ _____
   A. $e^{-4t}t^4$  B. $e^{-4t}t^6$  C. $\frac{e^{-4t}t^5}{5!}$  D. $\frac{e^{-4t}t^6}{5!}$

7) $L^{-1}\left( \frac{e^{-45}}{s^2} \right) =$ _____
   A. $(t - 4)u(t - 4)$  B. $(t + 4)u(t - 4)$  C. $(t + 4)u(t + 4)$  D. None

8) The series $4 - 1 + \frac{1}{4} - \frac{1}{16} + \ldots$ is _____
   A. Divergent  B. Convergent  C. Oscillate  D. None

9) If $f(x) = x^{13} + \sin x$, $-\pi \leq x \leq \pi$ then the Fourier coefficient $a_0 =$ ____
   A. $\frac{\pi^3}{2}$  B. $0$  C. $-\frac{\pi^3}{3}$  D. None

10) If $f(x) = |x^3|$, $x \in [-\pi, \pi]$ then Fourier co-efficient $a_n =$ _______
    A. $\frac{\pi^3}{2}$  B. $0$  C. $\frac{\pi^4}{4}$  D. None

11) In binomial distribution, formula of calculating standard deviation is _____
    A. $\sqrt{p}$  B. $\sqrt{pq}$  C. $\sqrt{np}$  D. $\sqrt{nnp}$

Q-2 Attempt any Ten.

1) Solve: $\frac{dy}{dx} + y \cot x = 4x \cos \cot x$

2) Solve: $(\tan y + x)dx + (x \sec^2 y - 3y)dy = 0$

3) Find the Fourier series to represent $f(x) = x^2 - 2$ when $-2 \leq x \leq 2$.

4) Find the Fourier series of $f(x) = x$; $-\pi \leq x \leq \pi$.

5) Find $L\left( \frac{1-e^{-t}}{t} \right)$

6) Find $L\left\{ 5e^{-\frac{t}{2}} + t^{-\frac{1}{3}} + 7 \sin \left( \frac{t}{2} \right) \right\}$

7) Find $L^{-1}\left\{ \frac{s+7}{s^2+2s+2} \right\}$
8) Show that \( \int_0^\infty t e^{-3t} \sin t \, dt = \frac{3}{50} \)

9) Find \( L\{\cos t \, u(t - \pi)\} \)

10) Examine the series \( \sum_{n=1}^{\infty} \frac{2^n}{3^n} \) for convergence and if it is convergent find its sum.

11) The time \( x \) in years that an employee spent at a company and the employee's hourly pay, \( y \), for 5 employees are listed in the table below. Calculate and interpret the correlation coefficient \( r \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>5</th>
<th>3</th>
<th>4</th>
<th>10</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>25</td>
<td>20</td>
<td>21</td>
<td>35</td>
<td>38</td>
</tr>
</tbody>
</table>

**Q-3** Attempt any FIVE

1) Find \( L^{-1} \left\{ \frac{1}{(s^2+1)(s+3)} \right\} \) using the method of Partial fraction.

2) Find the half-range sine fourier series of \( f(x) = \pi - x \) in the range \([0, \pi] \)

3) Solve: \( (D^2 - 2D + 1)y = \frac{4e^x}{x^2} \)

4) Examine the series \( \sum_{n=0}^{\infty} \left( \frac{5n-3n^3}{7n^3+2} \right)^n \) for convergence using the Root Test.

5) Solve: \( \frac{dx}{dt} - 7x + y = 0 \), \( \frac{dy}{dt} - 2x - 5y = 0 \)

6) The table below shows the number of absences, \( x \), in a Calculus course and the final exam grade, \( y \), for 7 students. Find the equation of the regression line.

<table>
<thead>
<tr>
<th>( x )</th>
<th>1</th>
<th>2</th>
<th>6</th>
<th>5</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>85</td>
<td>80</td>
<td>55</td>
<td>90</td>
<td>95</td>
</tr>
</tbody>
</table>

**Q-4** Attempt any THREE

1) Using Convolution theorem find \( L^{-1} \left\{ \frac{1}{(s-1)(s^2+1)} \right\} \)

2) Using Laplace transform solve:

\[
y'' + 4y' + 3y = e^{-t}, \ y(0) = y'(0) = 1
\]

3) Find the Fourier series of \( f(x) = \begin{cases} \pi + x & , \ -\pi < x < 0 \\ \pi - x & , \ 0 < x < \pi \end{cases} \)

Hence deduce that \( \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{\pi^2}{8} \)

4) Examine the series \( \sum_{n=1}^{\infty} \frac{(-1)^n}{4^{2n+1}(n+1)} \) for convergence using the Ratio Test.

5) Solve: \( \frac{d^2y}{dx^2} - 3 \frac{dy}{dx} + 2y = \frac{e^x}{(1 + e^x)} \) by method of variation of parameters.

-----X-----
Q.1 (a) Which are the different types of lines are used in drawing and explain its importance? (05)
(b) Draw the Symbols of
(i) City or Town (ii) Dam (iii) Siren
(iv) Sliding door (v) Bottom hung window (vi) Exhaust fan
(c) What is the maximum plinth area of residential plot of 200 sq m if FSI is 1 for the particular residential area? (02)

Q.2 (a) What are building bye-laws? What is set back? (05)
(b) What do you understand by these principles of building planning? Explain Roominess and circulation in detail. (05)

Q.3 (a) What is the difference between fat lime and hydraulic lime? (05)
(b) Which types of bricks are available in market and also classified bricks as per quality and utility. (05)
(c) Explain Rapid hardening cement and High alumina cement. (05)

Q.4 (a) Distinguish between load bearing and framed structure? (05)
(b) Draw the wall footing for 30cm thick wall. (05)
(c) The figure-3 represents the plan of a superstructure of wall and section represents the cross sections of the wall with foundation. Estimate the quantities of
(i) Earthwork in excavation in foundation
(ii) Plain Cement Concrete(P.C.C.) in foundation
(iii) Brick work in foundation and plinth
(iv) Brickwork in super structure
(v) 12mm thick plaster work (05)

Q.5 Draw and explain the two point perspective of the object as shown in Figure-1. Take suitable scale and retain all construction lines. (15)

Q.6 Draw the detail plan, elevation and section at X-X as shown in the line sketch diagram Figure-2. Also prepared schedule of opening. (15)
COLLEGE OF FOOD PROCESSING TECHNOLOGY & BIO ENERGY
ANAND AGRICULTURAL UNIVERSITY, ANAND 388110

END SEMESTER EXAMINATION MAY-2017
SECOND SEMESTER OF B.TECH.-I (FPT)

Day: Thursday       Date: 18/05/2017       Year: 2017       Time: 10:00 a.m. to 12:30 p.m.

SUBJECT CODE: FPE121

SUBJECT: BASIC CIVIL ENGINEERING

FIGURE-1

FIGURE-2

FIGURE-3
All questions are compulsory.

Q.1: (A) Fill in the blanks:

(i) .................. is a form of energy transfer to or from a system which occurs from hot to cold.
(ii) Sign Convention: Heat gained (absorbed) is considered .................. ; heat lost by system to surroundings is ..................
(iii) .................. energy is energy associated with the movement of an object.
(iv) The maximum efficiency of a heat engine operating between 100°C and 25°C is ..................%.
(v) Ceiling fan is an example of .................. system.
(vi) Solidification of liquid shows .................. in entropy.
(vii) The sum of internal energy (U) and the product of pressure and volume (p.V) is known as ..................
(viii) Heat and work are .................. functions.
(ix) The basis for measuring thermodynamic property of temperature is given by .................. law of thermodynamics.
(x) One watt is equal to .................. N.m/s.

(B) State whether following statements are True or False.

(i) Pressure is an intensive property.
(ii) When a system undergoes a change at constant pressure, it is referred to an isothermal process.
(iii) All spontaneous processes proceed in one direction only.
(iv) Internal energy change of an ideal gas is expressed as: $du = C_v dT$.
(v) Isochoric process is one in which no mechanical work is done by the system.
(vi) In an isochoric process, the internal energy increases.
(vii) Total heat of a substance is also known as internal energy.
(viii) First law of thermodynamics furnishes the relationship between heat, work and properties of the system.
(ix) Work done in a free expansion process is zero.
(x) Carnot cycle has maximum efficiency for reversible engine.
Q.2: (A) Define closed, open and isolated system, give two examples of each.
(B) In a non-flow process carried out on 5.4 kg of a substance, there was a specific internal energy decrease of 50 kJ/kg and a work transfer from the substance of 85 kJ/kg. Determine the heat transfer and state whether it is gain or loss.

Q.3: (A) Show that coefficient of performance of refrigerator and heat pump can be related as:
\[ \text{COP}_\text{ref} = \text{COP}_\text{HP} - 1 \]
(B) What is a reversible process? A reversible process should not leave any evidence to show that the process had ever occurred. Explain.

Q.4: 85 kJ of heat are supplied to a system at constant volume. The system rejects 90 kJ of heat at constant pressure and 20 kJ of work is done on it. The system is brought to its original state by adiabatic process (as shown in Fig. below). Determine the adiabatic work. Determine also the values of internal energy at all end states if initial value is 100 kJ.

Q.5: (A) In a winter season when outside temperature is \(-1^\circ\text{C}\), the inside of house is to be maintained at \(25^\circ\text{C}\). Estimate the minimum power required to run the heat pump of maintaining the temperature. Assume heating load as 125 MJ/h.
(B) Explain/Define the following:
   (i) Kelvin Planck and Clausius statements of second law of thermodynamics.
   (ii) Specific heats at constant volume and at constant pressure.

Q.6: Define the following terms:
   (i) Dryness fraction  (ii) PMM1  (iii) Pure substance  (iv) Control volume  (v) Entropy

Q.7: Explain the Carnot heat engine cycle executed by a stationary system.
Q.1 Answer in Brief (any Eight) (16)
(a) What is meant by the term “Barrier Potential”. What are its value for Silicon and Germanium diodes ?
(b) What do you mean by Conduction band & Valence band? Explain with the help of diagram.
(c) Draw the Generalized block diagram of Power Supply and explain its different parts?
(d) A certain n-p-n transistor with $\beta = 100$ has a base to collector leakage current $I_{CBO} \text{ of } 4 \mu A$. The transistor is connected in common emitter configuration. Calculate the collector current if the base current $I_B = 40 \mu A$.
(e) State the regions of operation of a transistor & explain the biasing conditions for the regions
(f) Draw the circuit diagram of Collector Feedback Circuit & find the value of $I_B$
(g) i) $A+1=\ldots\ldots\& A.A=\ldots\ldots$
   ii) $A+BC=\ldots\ldots$
   iii) NAND Gate=Bubbled $\ldots\ldots$ & NOR Gate = Bubbled $\ldots\ldots$
   iv) $A+A.B=\ldots\ldots$
(h) Explain the difference between Combinational and Sequential Circuits
(i) Draw and explain D Flip Flop with the help of its truth table.
(j) Explain different types of Systematic Errors that may occur in measurement?

Q.2 (a) What is PN Junction? Explain the formation of PN Junction with the help of diagram? (04)
(b) Draw and Explain the VI Characteristics of PN Junction Diode in both the Forward Bias and Reverse Bias conditions? (04)
(c) Explain & differentiate between working of Half Wave Rectifier, Full Wave Rectifier, Bridge rectifier with the help of necessary waveforms and diagrams ? (08)

Q.3 (a) Explain the need for the Transistor and also explain the various terminals of Transistor with the help of neat diagrams? (06)
(b) Draw the figures of Common Emitter ,Common Base and Common Collector Transistor configurations showing Input Current ,Output Current, Input Voltage & Output Voltage separately (04)
(c) A p-n-p germanium transistor is used in the Voltage Divider Biasing arrangement with $V_{CC} = 5V$, $R_1 = 27k\Omega$, $R_2 = 3k\Omega$, $R_E = 270\Omega$, $R_C = 2k\Omega$ and $\beta = 50$. Find $V_{CEO}$ and $I_CQ$. (06)
Q.4  (a) Draw the circuit using the Basic Logic Gates to obtain the following output $A.B + B.C + \overline{A} \overline{B}$ (04

(b) Determine the Boolean expression for the logic circuit shown in figure
Simplify the Boolean expression using Boolean Laws and De Morgan’s theorem.
Redraw the logic circuit using the simplified Boolean expression.

(c) Simplify the Boolean function $A \overline{B} C + B + B \overline{D} + A \overline{B} \overline{D} + \overline{A} C$ (04

Q.5  (a) Implement AND, OR & NOT Logic Gates using NAND Gate & NOR Gate? (06

(b) Explain the following terms with the help of example
(i) Accuracy & Precision
(ii) Instrument & Electronic Instrument
(iii) Error & Resolution
(iv) Different Types of Standard

(c) From the value in Table, calculate the precision of 6th measurement?

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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_n$</td>
<td>98</td>
<td>101</td>
<td>102</td>
<td>97</td>
<td>101</td>
<td>100</td>
<td>103</td>
<td>98</td>
<td>106</td>
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</tbody>
</table>
College of Food Processing Technology and Bio Energy
Anand Agricultural University, Anand – 388110

Semester End Exam, B. Tech. 2nd Semester, Reg. No:
Subject: Food Chemistry (FQA-121) Max. Marks: 80 Date: 16\textsuperscript{th} May, 2017, Time: 10:00 – 12:30

Q - 1: \textit{Answer in few words}

1. Type of water which cannot be frozen
2. Ion which contain both positive and negative charge
3. Net charge on protein at isoelectric pH
4. Deficiency of this vitamin causes night blindness
5. Name two products resulting from sucrose hydrolysis
6. Starch component which retrograde relatively faster
7. Give example of one non enzymatic browning reaction
8. Give any two examples of antioxidants
9. Which kind of fat crystals are desirable in chocolate
10. Name one mineral which is essential for bone health

Q - 2: \textit{Answer in sufficient details}

1. Describe any two functional properties of proteins
2. Explain titration curve of amino acid
3. Describe sorption isotherm with different zones and hysteresis
4. Explain functions of lipids
5. Explain lipid autoxidation process
6. Explain starch gelatinization and retrogradation
7. Write short note on glucose and fructose
Q.1 Write short note (any eight)
1. Antagonistic growth of microorganism in food.
2. Describe the process of microbial growth with a diagram.
3. Summarize methods and principles of food preservations.
4. What are the causes of food-borne gastrointestinal disorders?
5. What a food microbiologist student is expected to know?
6. Briefly discuss how an understanding of the microbial sources in food can be helpful to a food microbiologist.
7. Write down short note on food borne bacterial intoxication and food borne bacterial infection.
8. Under a given growth condition, the initial population of $10^4$ cells/ml of bacterial species increases to $10^6$ cells/ml in 120 minutes. Find the generation time.
9. Write about importance of viruses in foods

Q.2 Answer the following (any two)
1. Enlist the sources of microorganisms in foods and explain water as source of microorganisms in foods.
2. List the intrinsic and extrinsic factors necessary for growth of microorganisms in foods. Discuss the role of pH in growth of microorganisms in foods.
3. Define the food spoilage and describe microbial spoilage of canned foods

Q.3 Differentiate the following (any two)
1. Gram Positive and Gram negative bacterial cells
2. Yeast cell and Mold cell
3. Osmophilic bacteria and Halotolerant Bacteria
4. Lipolytic bacteria and Proteolytic Bacteria
Q.1 Attempt any FIVE

i). Define the computer. Describe the characteristics of computer.

ii). Draw a block diagram of a computer and explain CU and ALU.

iii). What is software? Explain different types of software.

iv). What is Flowchart? Explain different symbol used in Flowchart. Draw a Flowchart that will read the two sides of a rectangle and calculate its area.

v). Differentiate between RAM and ROM.

vi). List different types of computer and explain Large computers in brief.

Q.2 Answer the following

i). List different types of operators. Explain Relational operators with example.

ii). Ramesh’s basic salary is input through key board. His dearness allowance is 40% of the basic salary, and house rent allowance is 20% of the basic salary. Write a program to calculate his gross salary.

iii). Write a program to input a number through keyboard and determine whether a number is prime or not.

Q.3 Answer the following.

i). Explain if else condition and else if ladder with suitable example.

ii). Explain three different part of a loop? Write a difference between while and do… while loop.

iii). What is Function? Write a program using user defined function to find power of base and exponent provided through keyboard.

iv). What is an array? Explain memory map of an Array with proper example.

v). Explain switch… case and default statements with suitable example.
Q.4 Answer the following (Any FIVE)

i). Write a C program to input a number through keyboard and find the factorial of given number using Function.

ii). Write a program to input 10 elements in an array and find maximum.

iii). Define Pointer. Explain Call by Value and Call by Reference with example.

iv). IF five subjects marks are input through keyboard. Write a C Program using else if to display Class obtained based on following condition.

- If Percentage is $\geq 70\%$ - Distinction
- Percentage between 60 and 70 - First Class
- Percentage between 50 and 60 - Second Class
- Percentage between 40 and 50 - Pass Class
- If Percentage is $< 40\%$ - Fail

v). Write a program to generate following output using loop.

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

vi). If the five digit number is input through keyboard write a program to reverse the number.

**** ******