2018-19
B. TECH. (AUTUMN SEMESTER) EXAMINATION
ATMOPHERIC CHEMISTRY
OPEN ELECTIVE (O.E.)
AC-308

Maximum Marks: 60   **Credits: 04**   **Duration: Two Hours**

Answer all questions.
Assume suitable data if missing.
Notations and symbols used have their usual meaning.

Q.No.	Question	M.M.
1(a)	Enlist the chemical species present in various zones of the atmosphere. Discuss the significance of stratosphere and thermosphere with suitable diagram.	[6]
1(b)	Write the short notes on the following:	[3×3]
	(i) National Ambient Air Quality Standards (NAAQS)	
	(ii) Composition of the atmosphere	
	(iii) Classification of air pollutant on the basis of composition and state of matter	
2(a)	What are the criteria pollutants under NAAQS? Explain the formation and health hazard of volatile organic compounds and oxides of nitrogen.	[6]

OR

2(a')	Give the catalytic cycle mechanism for the formation of ozone by nitric oxide.	[6]
2(b)	Discuss the physical and chemical characteristics of particulate matter.	[3]
2(c)	Write short notes on **any two** of the followings:	[3×2]
	(i) Cyclone separators	
	(ii) $PM_{2.5}$ and PM_{10}	
	(iii) Fabric filters	
3(a)	What is air quality monitoring and why monitoring is important? What are the basic considerations of air sampling?	[05]
3(b)	Explain the estimation of SO_2 by PRA method and Lead candle method with chemical equations.	[04]
3(c)	Write short notes on **any two** of the followings:	[3×2]
	(i) Adsorption and Absorption	
	(ii) Volumetric and Gravimetric Analyses	

(iii) Atomic Absorption Spectrometry

4(a) Discuss the regional impacts of temperature change on Asian and African continent. [6]

4(b) Describe the significance of hydrological cycle with labelled diagram. [3]

4(c) Write informative notes on **any two** of the followings: [2×3]

(i) Impact of increased exposure to UV radiation on human being

(ii) Catalytic destruction of ozone

(iii) Syn fuel

2018-19
B.TECH. (AUTUMN SEMESTER) EXAMINATION
OPEN ELECTIVE (ALL BRANCHES)
NUMERICAL TECHNIQUES
AM351

Maximum Marks: 60   **Credits: 04**   **Duration: Two Hours**

*Answer **all** questions.*
Programmable calculators are not allowed.
Write answers up to four decimals.

Q. No.	Question	M.M.

1 (a)   Solve the following system of equations   [07]

$$\begin{bmatrix} 2 & 1 & 1 & -2 \\ 4 & 0 & 2 & 1 \\ 3 & 2 & 2 & 0 \\ 1 & 3 & 2 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} -10 \\ 8 \\ 7 \\ -5 \end{bmatrix}$$

by using Gauss elimination method with partial pivoting.

OR

(a)'   Use Gerschgorin's theorem to find the bounds for the eigenvalues λ of the real   [07]
$n \times n$ matrix A ($n \geq 3$):

$$A = \begin{bmatrix} a & -1 \\ -1 & a & -1 & & 0 \\ & -1 & a & -1 \\ & & & \cdot \\ & 0 & & & \cdot \\ & & & & & \cdot \\ & & & & -1 & a \end{bmatrix}$$

Show that the components x_i of the eigenvector x obey a linear difference
equation. Hence find all the eigenvalues and eigenvectors.

(b)   Compute singular value decomposition (SVD) of the matrix A: [08]

$$A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 1 & 3 \end{bmatrix}.$$

2(a)   Determine the step size h that can be used in the tabulation of a function $f(x)$,   [07]

$a \leq x \leq b$, at equally spaced nodal points so that the truncation error of the cubic

interpolation is less than ϵ. Hence find h, for $f(x) = \cos 2x, 0 \leq x \leq \pi/4$ and

$\epsilon = 10^{-6}$.

OR

(a)'   Obtain the rational approximation $R_{2,3}(x)$ for the function $\tan^{-1} x$. Also find the   [07]
order of its approximation.

(b) 　　**(i)** 　　Find the values of α and β such that the function 　　　　[3+5]

$$f(x) = \begin{cases} x^2 - \alpha x + 1, & 1 \le x \le 2 \\ 3x - \beta, & 2 \le x \le 3 \end{cases}$$

　　　　is a quadratic spline.

　　(ii) 　　Obtain the piecewise cubic interpolating polynomial for the function $f(x)$ defined by the given data:

x	−5	−4	−2	0	1	3	4
f(x)	275	−94	−334	−350	−349	−269	−94

　　　　Interpolate at $x = -3$ and $x = 2$.

3(a) 　Determine the polynomial of second degree, which is the best approximation in 　[07] minimax norm to $\sqrt{x}$ on the set of points $\left\{0, \frac{1}{9}, \frac{4}{9}, 1\right\}$.

(b) 　For the function $f(x) = 1 + \sin 2x$ on the interval $[0,\pi]$, determine L_1, L_2 and L_∞ 　[08] norms with respect to weight function $w(x) = x$.

<div align="center">OR</div>

(b)' 　A person runs the same track for five consecutive days and is timed as follows: 　[08]

Days(x)	1	2	3	4	5
Time(y)	15.30	15.10	15.00	14.50	14.00

　　Make a least square fit to the above data using the function $y = a + \frac{b}{x} + \frac{c}{x^2}$.

4(a) 　A snack food manufacture markets two kinds of mixed nuts, labelled A and B. Mixed 　[07] nuts A contains 20% almonds, 10% cashew nuts, 15% walnuts and 55% peanuts. Mixed nuts B contains 10% almonds, 20% cashew nuts, 25% walnuts and 45% peanuts. A customer wants to use mixed nuts A and B to prepare a new mix that contains at least 4 lb of almonds, 5 lb of cashew nuts and 6 lb walnuts for a party. If mixed nuts A and B cost \$2.5 and \$3 per pound, respectively. Determine the mixed nuts A and B to be used to prepare the new mix at minimum cost.

(b) 　Write the dual of the following LPP and then solve, graphically: 　　　　[08]

Minimize 　　$Z = 24y_1 + 6y_2 + y_3 + 2y_4$

Subject to 　　$6y_1 + y_2 - y_3 \ge 5;$

　　　　　　$4y_1 + 2y_2 + y_3 + y_4 \ge 4 ;$

　　　　　　$y_i \ge 0$ for $i = 1,2,3,4.$

<div align="center">OR</div>

(b)' 　Solve the following LPP, by simplex method: 　　　　　　[08]

Maximize 　$Z = 2x + 2y + 4z$

Subject to 　　$2x + y + z \le 2;$

　　　　　　$3x + 4y + 2z \ge 8;$

　　　　　　$x, y \ge 0.$

2018-19
B. TECH. (AUTUMN SEMESTER) EXAMINATION
OPEN ELECTIVE
NANOPHYSICS AND NANOTECHNOLOGY
AP309

Maximum Marks: 60   **Credits: 04**   **Duration: Two Hours**

Answer all questions. Notations and symbols used have their usual meaning.

Q.No.	Question	CO	M.M.
1(a)	Define the term nanotechnology. Who coined this term and when? Write a brief history of the development of nanotechnology, highlighting the contribution of Richard Feynman.	(CO1)	[10]
1(b)	Write notes on any two properties of nanomaterials: (i) Optical (ii) Mechanical (iii) Electronic	(CO1)	[05]
2(a)	What are the two principal factors that cause the properties of nanomaterials to differ significantly from bulk materials?	(CO2)	[05]
2(b)	What are excitons? Explain single electron tunnelling in detail.	(CO2)	[04]
2(c)	Explain the formation of quantum wire and quantum dot by lithography with a suitable diagram.	(CO2)	[06]

OR

Q.No.	Question	CO	M.M.
2(c')	Define density of states (DOS) and draw graphs of DOS as a function of the energy E for conduction electrons delocalized in 3D, 2D, and 1D materials.	(CO2)	[06]
3(a)	What is remanent magnetization or residual magnetism (M_r) in ferromagnetic materials?	(CO2)	[02]

OR

| Q.No.	Question	CO	M.M.
3(a')	Illustrate the various arrangements of individual atomic magnetic moment that constitute paramagnetic, ferromagnetic and anti-ferromagnetic materials.	(CO2)	[02]

3(b) Find value of coercivity (H_C), residual magnetization (Mr), saturation   (CO2)   [09]
magnetization (Ms) from the given M-H curves for pure and doped
samples. Analyze the data and give suitable explanation about the magnetic
properties of the given sample.
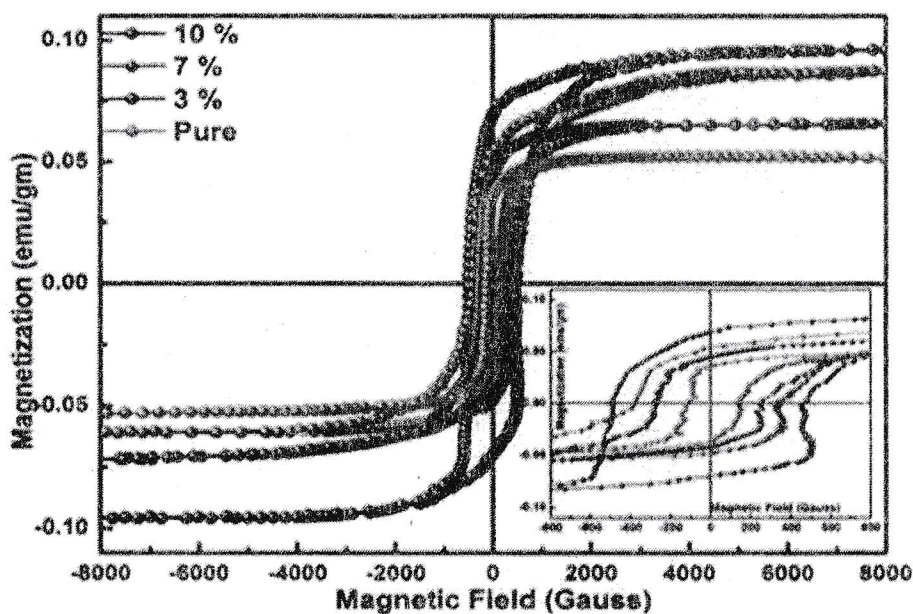
3(c) What is magnetoresistance? Differentiate between giant and colossal   (CO2)   [04]
magnetoresistance.

4(a) Draw a neat diagram showing the molecular structure of graphene. Mention   (CO3)   [03]
its peculiar properties which make it suitable for various potential
applications.

4(b) Differentiate between graphene and graphene oxide. Explain in detail one   (CO3)   [07]
method of synthesis of each.

4(c) What are nanofluids? Discuss the role of graphene in enhancing the thermal   (CO4)   [05]
conductivity of nanofluids.

****

B. TECH. AUTUMN END-SEMESTER EXAMINATION - 2018

(CIVIL ENGINEERING)

DISASTER MANAGEMENT CE-444N (OE)

Duration : Two Hours   **MM = 60**

Note: Answer all questions. Marks are given in parenthesis. Assume suitable values if data are not given.

Q1(a) Describe briefly the construction and principle of Wood-Anderson Seismograph. How can we find seismic moment magnitude?   **(6)**

Q1(b) At recording station a difference in time of arrival between P and S waves was observed to be 1.5seconds. What is the approximate distance from the station at which the event occurred? Assume P-wave velocity as 4km/s and S-wave velocity as 2km/s

   (3)

Q1(c) Derive the relation for logarithmic decrement for a free vibration body. For a system with damping ratio 5%, determine the number of free vibration cycles required to reduce the displacement amplitude by 80% of the initial amplitude, if the initial velocity is zero.

   (6)

OR

Q1'(c) A single degree of freedom system (SDOF) consists of a mass of 200kg and a spring constant K= 550kN/m. while testing the system a relative velocity of 30cm/sec was observed on application of a force of 500N. Determine the damping ratio, damping frequency of vibration, logarithmic decrement and the ratio of two consecutive amplitudes.   **(6)**

2   Answer any three of the following: **3 x 5**

(a)   What are various types of dynamic loads? In what way is the earthquake resistance of a structure affected by (i) non-symmetry (ii) elongated shape of the building?

(b)   Discuss how to increase the following for a building in earthquake prone areas?
(i) Period of vibration (ii) Energy dissipation capacity (iii) Ductility

(c)   Discuss the following types of failures RCC building
(i) Ductile failure (ii) Flexure failure (iii) Failure of Joints

(d)   Illustrate the IS code provision for calculation of design wind force on building cladding

(e)   Define the following terms:
(i) Bluff body (ii) Terrain category (iii) Hurricanes (iv) Dampers

Q 3 (a) Discuss any five flood management policies laid down by Rashtriya Barh Ayog (RBA).

(7)

(b) Discuss briefly remote sensing technique for flood management. An urban catchment having slope as 0.0075 and the maximum length of travel of water is 1450 m. the maximum depth of rainfall with a 25 year return period is as below: (8)

Duration (min)	5	10	20	35	45	60	75	90
Depth of rainfall (mm)	15	28	35	50	65	72	85	110

Estimate the required peak flow rate from the catchment for the culvert design. The land use of the area and corresponding area and runoff coefficients are given below:

Land use	Area (km^2)	Runoff coefficient
Settlement	15	0.7
Agricultural land	12	0.35
Barren land	13	0.6
Orchard	5	0.46

4 (a) Give a short account of geological/geophysical disasters. What preparedness can be carried out to minimize their affect?   (7)

4 (b) Discuss different measures of slope protection for controlling landslides. Show some important methods with the help of a neat diagram.   (8)

OR

4' (b) Write a short account of disaster management activities in India. Cite examples of some recent disaster in India and mitigation strategies of disaster management authorities. (8)

2018-19
DEPARTMENT OF CIVIL ENGINEERING
B.Tech. VII Semester Examination
Project Management CE-484 (Open Elective)

Maximum Marks:60   **Duration: Two Hours**

Note: (i) Answer ALL Questions
 (ii) Answer to any part of the question should begin from FRESH page
(iii) All parts of a question should be attempted in sequence in one copy
(iv) All questions carry equal marks
 (v) Assume any data if not given

Q. 1 (a) Write down the definition of the project given by Project (2) Management Institute USA and UNIDO

(b) Define and discuss various phases of project in detail with (6) examples

(c) Explain essential factors of production in brief (4)

Q.2 (a) Explain six inherent nature of a project in detail with examples (6)

(b) Define and explain the following types of cost with example (6x1=6)
 (i) Conversion Cost
 (ii) Imputed Cost
 (iii) Opportunity Cost
 (iv) Intrinsic Cost
 (v) Replacement Cost
 (vi) Annual Cost

Q.3 (a) Explain the following concepts, used as in statistical analysis of a set of data (6)
 (i) Arithmetic Mean (ii) Geometric Mean (iii) Harmonic Mean
 (iv) Range (v) Variance (vi) Deviation and Standard Deviation

 Also mention suitability of use of each concept along with inherent type of data and phenomenon under study with example

(b) In figure -1, a PERT Network for a Product Development Project (6) is given along with Optimistic, Most Likely and Pessimistic Time Estimates. On the basis of data given in network, determine the Critical Path and Project Completion Time having probability of 50 percent

Q.4 (a) What do you understand by the term specification, in context of (6)
           purchasing? Explain different types of specifications used in
           industry with example

     (b) Discuss in detail the process of establishing Need Definition in (6)
           context of purchasing of capital equipment

OR

Q.4´ (a) In what ways commercial purchasing is different from house hold (4)
           Purchasing?

     (b) What are the various issues to be examined, during the purchase of (8)
           Capital Equipment?

Q.5 (a) Discuss concept of wage and its types in detail (6)

     (b) Discuss basic philosophy of various types of rewards offered in (6)
           lieu of achievement to a worker in the industry

OR

Q.5´ (a) Discuss in detail various factors which determine the wage fixation (6)
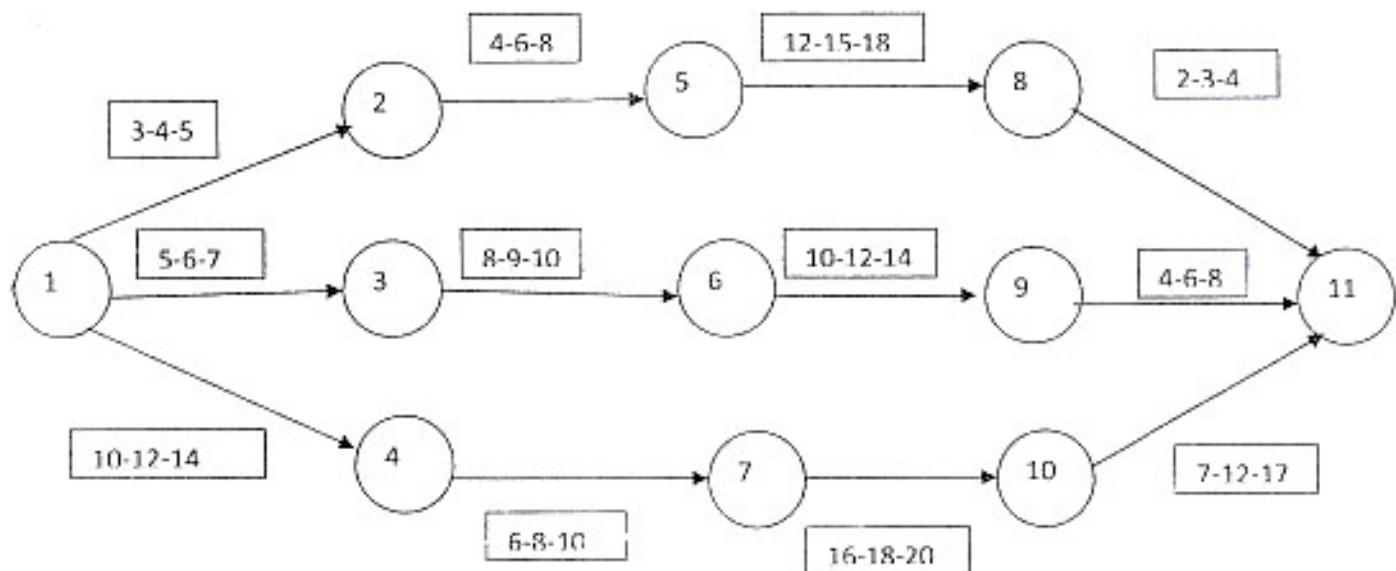
     (b) Discuss various elements of H R Planning (6)

Fig-1

2018-19
B. TECH. / B. ARCH. (ODD SEMESTER) EXAMINATION
INTELEECTUAL PROPERTY RIGHTs (IPR)
(OPEN ELECTIVE)
(HU-301)

Maximum Marks: 60   **Duration: 2: 00 Hours**

Note   *Answer all the questions.*

1.   (a)   Define Intellectual Property (IP). Explain the scope of IP as expanded by WIPO and TRIPS.   **(6)**
(CO-1)

(b)   Discuss the salient features of important International Conventions and Treaties concluded in   **(9)**
the field of various Intellectual Property Rights. **(CO-1,3)**
OR

(b')   (i)Define Traditional Knowledge. How can we protect Traditional Knowledge? **(CO-1,2)**   **(4)**

(ii) Define Patent. What role is played by Patent in the development of a nation? **(CO-1,4)**
(5)

2.   (a)   List out the various steps involved in the process from filing till the grant of patent. Is it   **(5)**
possible to file an application for patent when your proposed invention is at conceptual stage?
(CO-2,3)

(b)   Enumerate those categories of inventions which are not patentable. **(CO-4)**   **(5)**
OR

(b')   What do you understand by Provisional Specifications and Complete Specification in resr_ct   **(5)**
of patent application? **(CO-2,4)**

(c)   Define invention. What conditions must be met to obtain patent protection for it? **(CO-1,2,4)**   **(5)**

3.   (a)   Copyright is a "bundle of rights". Do you agree? Describe various rights enjoyed by an owner   **(7.5)**
of copyright. **(CO-1,3)**

(b)   Distinguish between Copyright Infringement and plagiarism. If an author puts the information   **(7.5)**
from different sources into his own words, does he still need to include citations? **(CO-1,3)**

4.   (a)   Define Geographical Indication of Goods? How is it different from Trademark? Refer case   **(7)**
law. **(CO-1)**

(b)   Explain any **two (02)** of the following: **(CO-1)**

(i)	Rights of registered Trademark owner	**(04)**
(ii)	Certification Trademark, Collective Mark & Well Known Trademark	**(04)**
(iii)	Trademark Infringement	**(04)**
(iv)	Prohibitions of registration of certain Geographical Indications	**(04)**

2018-19
B.TECH./B.ARCH. (AUTUMN SEMESTER) EXAMINATION
(OPEN ELECTIVE)
AIR POLLUTION TECHNOLOGY
(ME-425)

Maximum Marks: 60   Credits: 04   Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.

Q.No.	Question	M.M.
1(a).	Define "Albedo" and discuss how does the changes in albedo of earth's surface & the albedo of atmosphere affect the Global Climate?	[06] CO1
1(b).	Define "Lapse Rate" and with the help of Adiabatic lapse rate & Environmental lapse rate profiles, explain the stability conditions.	[06] CO1
1(c).	For a township, applying PINDEX scheme, the following values were obtained (after applying Tolerance Factors)	[03] CO1

PINDEX = 1.41
Particulte Matter (PM) = 0.381
Sulphur Oxides (SO_x) = 0.086
Nitrogen Oxides (NO_x) = 0.204
Carbon Monoxide (CO) = 0.181
Hydrocarbons (HC) = 0.111
Oxidants (OOO) = 0.361

Calculate 'SYNERGISM' term.

2.	Describe in detail the three routes through which NO may be formed during combustion process. Also discuss the abatement technique for NOx pollution from various combustion systems.	[15] CO2

OR

2'.	Describe the mechanism of formation of Oxides of Sulphur SO_x and the methods to reduce their emission.	[15] CO2
3(a).	What are the methods to collect the samples of Gaseous Air Pollutants from atmosphere?	[06] CO3

3(b). Explain with the help of line diagram, the Gas Filter Correlation (GFC) CO   [09] CO3
analyzer. What advantages it has over the conventional NDIR analyzer?

4. Show the arrangement of various components and the working principle of a   [08+07]
Regenerative Afterburner.   CO5

Methane is to be destroyed in a Flare. The flow rate is 0.25 m^3/s at 3 bar and
25 $^\circ$C. Assuming that the personnel will not be exposed to flare for periods
exceeding 20 minutes, find the height of the flare above the ground if its diameter
is 0.2 m. Take the lower calorific value of methane as 50 MJ/kg.

OR

4'(a). Describe Gravity Settling Chambers and Fabric Filters used to remove   [08] CO4
particulates from gaseous streams.

4'(b). Discuss the variation of HC, CO and NO concentration with equivalence ratio in   [07] CO4
a conventional SI engine.

2018-19
B.TECH. (AUTUMN SEMESTER) EXAMINATION
(ALL BRANCHES)
TOTAL QUALITY MANAGEMENT (TQM)
ME442
(OPEN ELECTIVE)

3461

Maximum Marks: 60   Credits: 04   Duration: Two Hours

Answer all the questions.
Assume suitable data if found missing.
Use of statistical tables and constants are allowed.

1(a). Explain the role of *"Top-management commitment"* and *"Quality Information and Performance Measurement"* as TQM practices to improve the performance of the organization.   CO1 [4]

OR (For part 1(a))

1'(a). Explain Juran's Trilogy for continuos quality improvement of products and processes in business organization.   CO1 [4]

1(b). Various causes for a defective material were brainstormed by a team of experts. The causes were written on Post Cards as listed below: CO1 [8]

Lack of skills of employees, Unsystematic purchase department, lack of commitment of supplier, poor quality materials used by supplier, poor quality of equipment, policy not clear, no contract review of specifications, ambiguous specifications, and unskilled employees of suppliers.

   i.   Organize the above causes as an Affinity diagram.
   ii. Also draw a Relationship diagram for the above.

2(a). Define Process Capability? What are *'Warning, Action and Stable Zones'* in a control chart? Depict them on a control chart.   CO2 [4]

2(b) In a manufacturing process the number of defectives found in the inspection of 20 lots of 100 samples is given below: CO2 [8]

Lot No.	No. of defectives	Lot No.	No. of defectives
1	5	11	7
2	4	12	6
3	3	13	5
4	5	14	5
5	4	15	4
6	6	16	2
7	9	17	8
8	18	18	17
9	11	19	6
10	6	20	4

   i.   Determine the control limits of p-chart and draw a p-chart. Also state whether the process is in control.
   ii. Determine the new value of control limits if some points are out of control. State whether the process is still in control or not

3(a). In a double sampling plan consider: N=1000, n_1 = 45, c_1 = 2, r_1=6, n_2 = 60 and c_2 = 5, CO3 [5]
r_2=8. Calculate the probability of accepting the lot if it contains 2% defective items.

3(b). In an industrial testing, a total number of 50 (N) components were tested in 5 hours. CO3 [7]
During the experiment the number of components failing each hour were noted and data
obtained are presented in below table. The process of testing ended when all the
components failed.

Time (t) (Hrs)	No. failed (per hr)	Cumulative failures
0	.	0
1	05	05
2	15	20
3	10	30
4	15	45
5	5	50

Perform the reliability related calculations by calculating Failure densities, Failure rates
and Reliabilities.

OR

3'(a) Construct OC and AOQ curves for the single sampling plan: CO3 [4]
n = 50, c =2 and assume N=10,000.

3'(b) For an institution, who wants to apply Quality Function Deployment (QFD) for design CO3 [8]
of a course, carry out the following:
  i. Find out the customer requirements i.e. WHATs?
  ii. Identify the technical requirements that will satisfy the customer requirements i.e.
    HOWs?
  iii. Develop a relationship matrix between WHATs and HOWs.
  iv. By choosing the importance of each requirement and assuming that this course is to
    be sold to a software organization and assuming that there are two better
    competitors for the course, develop customer importance rating and target weighing
    to HOWs (technical importance).
  v. Develop inter-relationship between HOWs (Roof of House of Quality).
  vi. Using all the above, develop a House of Quality.

4. What do you understand by 'ISO 9000 series of standards'? Explain in detail CO4 [12]
implementation and documentation procedures of QMS.

OR

4' Explain KAIZEN. What are 3MUs and 5-S activities used in quality improvement of an CO4 [12]
organization. Also draw a Malcolm Baldrige National Quality Award model for
incorporating quality initiative in an organization.

5. Explain the following: CO5 [4x3]
  i. Human Resource Framework
  ii. Hezberg Theory of motivation
  iii. Quality Circle

(3463)

2018-19
B.TECH (AUTUMN SEMESTER) EXAMINATION
ALL BRANCHES
(HEATING, VENTILATION AND AIR CONDITIONING)
(OPEN ELECTIVE)
ME 461

Maximum Marks: 60   **Credits: 04**   **Duration: Two Hours**

Answer all the questions.
Assume suitable data if missing.
Marks allotted to each question and course outcome (CO) covered are indicated against each question.
Use of Psychrometric Chart and Steam table is allowed.

Q.No.	Question	M.M.	CO
1(a)	What do you mean by air conditioning. Explain with neat and clean sketch, summer and winter air conditioning?	[08]	CO1
1(b)	Write a short note on various factors affecting the human comfort? Also explain and sketch the comfort chart?	[07]	CO1

OR

1'	A retail shop located in a city at 30°N latitude has the following loads: Room sensible heat = 58.15 KW and Room latent heat = 14.54 KW. The summer outside and inside design conditions are: Outside: 40°C DBT, 27°C WBT and Inside: 25°C DBT, 50% RH. 70m³/min of ventilation air is used and By-pass factor = 0.15. Dry bulb temperature of mixed air entering the cooling coil = 29.2°C. Dry bulb temperature of air leaving the cooling coil = 13.7°C Determine:	[15]	CO1

    a) Ventilation load   c) Grand total heat

    b) Apparatus dew point of coil   d) Effective room sensible heat factor.

2   An air conditioning system is designed for a restaurant when the following data is   [15]
available:

CO2

Total heat flow through the walls, roof and floor	6.2 kW
Solar heat gain through glass	2 kW
Equipment sensible heat gain	2.9 kW
Equipment latent heat gain	0.7 kW
Total infiltration air	400 m³/h
Outdoor conditions	35°C DBT, 26°C WBT
Inside design conditions	27°C DBT, 55% RH
Minimum temperature of air supplied to room	17°C DBT
Dry bulb temperature of mixed air entering the cooling coil	29.5°C
Seating chairs for dining	50
Sensible heat gain per sitting person	58 W
Latent heat gain per sitting person	44 W
Employees serving the meals	5
Sensible heat gain per employee	58 W
Latent heat gain per employee	76 W
Sensible heat added from meals	0.17 kW
Latent heat added from meals	0.3 kW
Motor power connected to fan	7.6 kW

If the fan is situated before the conditioner, then find the following:

(a) Room sensible heat factor.

(b) Apparatus dew point of the cooling coil.

(c) Apparatus dew point of the room.

(d) By-pass factor of the cooling coil.

3(a) What are different pressure losses in ducts? Explain Velocity reduction method and Static regain method of duct sizing? [08] CO3

3(b) Sketch and explain flow patterns in the room with;
a) supply system
b) extraction system
c) combined supply and extraction system. of ventilation? [07] CO3

OR

3'(a) What are radiators and convectors in a hot water or steam heating system? Discuss and sketch the consequences of the steam main pipe pitching towards and away from boiler in a steam heating system? [08] CO3

3'(b) Sketch a functional block control diagram for an open loop and for a closed loop system. Also label basic elements? [07] CO3

4(a) Explain the various Energy and cost saving methods used in HVAC systems? [08] CO4

4(b) Giving neat sketches briefly explain the working of thermostat and humidistat? [07] CO4