

Roll No. 201703103

B. Tech.
(Electrical Engineering)
Even Semester
Minor Test 2017-2018

FUNDAMENTALS OF MECHANICAL ENGINEERING

Time: 2 Hour

NOTE: Answer all questions.

Max. Marks: 20

1. Attempt any THREE parts of the following. Q.1(a) is compulsory.

 - (a) What will happen when diesel fuel is accidentally filled to a petrol car? Also Explain the working of a 4-stroke S.I. engine with neat diagrams.
 - (b) In a Diesel cycle, the compression ratio is 15. Compression begins at 0.1 Mpa, 40°C. The heat added is 1.675 MJ/kg. Find (a) the maximum temperature in the cycle, (b) work done per kg of air (c) the cycle efficiency (d) the temperature at the end of the isentropic expansion (e) the cut-off ratio.
 - (c) What are different sensors used in industrial applications? Write a note on temperature sensors used in industry.
 - (d) How the absolute instruments are different from secondary instruments? Enlist at least three errors that could occur during measurement.
2. Attempt any TWO parts of the following. Q.2(a) is compulsory.

 - (a) Differentiate in between comfort and industrial refrigeration system with suitable working cycle diagram and explanation. Also explain the C.O.P. of respective air conditioners.
 - (b) (i) What are the two statements that describe the Second Law of Thermodynamics?
Explain any one of them with suitable diagram.
(ii) What type of circulation used in boilers? Explain in brief.
 - (c) A reversible heat engine operates between two reservoirs at temperature of 600°C and 40°C. The engine drives a reversible refrigerator which operates between the reservoir at temperature of 40°C and -20°C. The heat transfer to the heat engine is 2000kJ and the net work output of the combined engine refrigerator plant is 360 kJ.

BME - 02

Roll No. _____

- i. Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C .
3. Attempt any TWO parts of the following. Q.3(a) is compulsory.
- (a) Explain the working of different measuring instruments with suitable diagram and applications; (4)
- (i) Sine Bar
 - (ii) Thermocouple
 - (iii) Dial Gauge
- (b) Define Transducer. What is its role in instrumentation? Also explain the classification of transducers. (2)
- (c) Define an alloy with suitable composition, properties that used for making an electrical appliance. (2)

Note: Answer all questions:-

Q.1. Attempt any three parts of the following. Q.1 (a) is compulsory.

- a) What is communication? What are the parts of communication? Explain
- b) Clarity and consistency are the most important features of communication. Describe
- c) What is listening comprehension? What measures should be taken to enhance listening skill? Discuss
- d) A good writer is not necessarily a good speaker. Describe

4

3

3

3

Q.2. Attempt any three parts of the following. Q.2 (a) is compulsory.

- a) Listing the barriers of communication analyze the psychological and semantic barriers of communication.
- b) What is reading with understanding? Give tips for improving and increasing the reading skill with a good speed.
- c) What is technical communication? How does a technical writing differ from pure literature? Discuss
- d) What are the advantages and disadvantages of oral communication? Describe

4

3

3

Q.3. Attempt any three parts of the following. Q.3 (a) is compulsory.

(A) Answer the following:

4

i. Write one-word substitution-

- (a) Which can be seen everywhere
- (b) Study of sciences relating to the bodily structure of human.

ii. Give antonyms-

- a) Climax
- b) Include

iii. Synonym of-

- a) Freedom
- b) Forgive

iv. Give meaning of the following homophones:

- a) Due, Dew
- b) Cite, Sight

(B) Fill in the blanks-

3

i. Suitable preposition-

- a) He is proficientlanguage. (from/ in/of)
- b) You should aim.... excellence.(by/with/at)

ii. Appropriate articles-

- a) He was given ...reward for bravery.
- b) Smith is going to....Sahara Desert.

iii. Proper conjunctions

- a) Take care...else it could be too late.
- b) He couldn't succeed.....he tried his best.

(C) What is Inductive order of writing a paragraph? Write a paragraph on the topic of your choice using this method.

3

(D) Write a Précis of the following passage and give suitable title to it:

3

There is an old saying that knowledge is power. Education is an instrument which imparts knowledge and therefore indirectly controls power. So since the dawn of civilization, persons in power have always tried to control or supervise education and its system. Therefore, it has been the handmaid of the ruling class. During the Christian era, the ecclesiastics controlled the institution of education and diffused the people the gospel of the Bible and religious teachings. These gospels and teachings were no other than a philosophy for the maintenance of the existing society. During the Renaissance, education passed from the clutches of the priests into the hands of the prince. Education, thus, combined is confined to the few elite.

Time: 2:00 Hrs.

Note: All questions are compulsory.**Q. 1. Attempt any three of the following questions. Q.1 (a) is compulsory.**

a) Solve the following differential equations:

i. $\frac{d^2y}{dx^2} + y = \sec x \tan x$

ii. $y'' + 3y' + 2y = \sin(e^x)$.

b) Solve $y'' - 2y' + 2y = e^x \tan x$ by method of variation of parameter.c) Solve: $x^2y'' + 3xy' + y = \frac{1}{(1-x)^2}$.

d) Solve:

$$\frac{d^2x}{dt^2} + 4x + y = te^t,$$

$$\frac{d^2y}{dt^2} + y = \sin^2 t.$$

4

3

3

3

Q. 2. Attempt any three of the following questions. Q.2 (a) is compulsory.(a) Solve: $(2x-1)^2y''' + (2x-1)y' - 2y = x$.b) Solve: $\sin^2 x y'' + \sin x \cos x y' + 4y = 0$.c) Solve in series: $x(1-x)y'' + (3x-1)y' + y = 0$.d) Solve in series: $(1-x^2)y'' + 2y = 0$.

4

3

3

3

Q. 3. Attempt any three of the following questions. Q.3 (a) is compulsory.a) Define Bessel's differential equation of p^{th} order and hence find its series solution in terms of Bessel's function.

4

3

b) Show that:

i. $xJ'_n = nJ_n - xJ_{n+1}$ ✓
ii. $J_{-p}(x) = (-1)^p J_p(x)$ where p is positive integer.

3

c) Show that:

i. $\frac{d}{dx} (J_n^2 + J_{n+1}^2) = 2\left(\frac{n}{x}J_n^2 - \frac{n+1}{x}J_{n+1}^2\right)$.
ii. $J_2 = J_0'' - \frac{1}{x}J_0'$.

3

d) Show that:

i. $nP_n = xP'_n - P'_{n-1}$.
ii. $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} (x^2 - 1)^n$.

3

Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any three of the following; Q.1 (a) is compulsory.

(a) Write a program in C to calculate the percentage of marks of five subjects of a student and print whether he is fail or pass with division using nested if-else, where marks are user input. Also, write a program in C to check leap year given as input by user. 4

(b) How CPU is different from operating system? Describe the booting process. 2

(c) Discuss the following:

i) Analog computer vs Digital computer ii) Low level language vs High level language

iii) Microcomputer vs Minicomputer

(d) What will be output of the following programs? Discuss the reason and show your calculations. 2

i) void main()

```

    {
        int x = -1, y = 0, z = 1;
        printf("%d", ++x && ++y || ++z);
        printf("%d%d%d", x, y, z);
    }
  
```

ii) void main()

```

    {
        int x = 10;
        printf("%d", --x + --x + x--);
        printf("%d", x);
    }
  
```

Q.2 Attempt any two of the following; Q.2 (a) is compulsory.

(a) Write a program in C to read three numbers and print the largest among them using nested if-else. And also write a program in C to print the days of week using switch statement. 4

(b) Differentiate the following:

i) microprocessor vs Microcontroller ii) Static RAM vs Dynamic RAM iii) Algorithm vs Program

(c) What is translator? Describe the program execution process. Show each step using diagram? 2

Q.3 Attempt any two of the following; Q.3 (a) is compulsory.

(a) Write a program in C to calculate the sum of following series:

187 184 181 178 175 172.....

Also find output of following programs and discuss the reason and show your calculations.

i) void main()

```

    {
        int i=0;
        printf("%d", 1||i!=5&&!i);
    }
  
```

ii) void main()

```

    {
        int a = -1, b = 0, c = 1, v;
        v = ((10 && c != 8 || !c) ? (-a>b ? 3:4) : (b ? 0:8));
        printf("%d", v);
    }
  
```

(b) Draw flow chart to generate first 'n' terms of Fibonacci series

2

(c) Write a program to display the following pattern.

```

      A
      A B
      A B C
      A B C D
      A B C D E
      A B C D E F
  
```

and so on -----

BAS-08

Roll No.

2	0	1	7	0	3	1	6	3	5
---	---	---	---	---	---	---	---	---	---

B.Tech.

EVEN SEMESTER

Minor Examination 2017-18

Subject: Engineering Physics-II

Time: 2 Hours

Max. Marks: 20

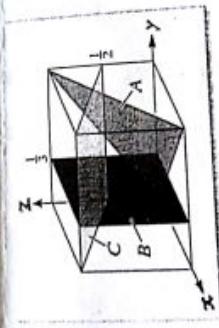
Note: Answer all questions

Q.1. Attempt any three parts of the following. Q. 1(a) is compulsory.

- a) Define the space lattice. Draw all possible Bravais lattices of 7 crystal structures? 4
b) Find the packing fraction for Simple, Body centered and Face Centered cubic crystals (SC, BCC and FCC). 2
c) Mention the basic requirements for the acoustically good halls. 2
d) What is the reverberation time? Explain it in context to the growth and decay of sound density. 2

Q.2. Attempt any two parts of the following. Q. 2(a) is compulsory.

- a) Find the Miller Indices for plane A, B, and C in following Figure. Draw the planes for Miller indices (320) and (110) 4



- b) Define symmetry and draw all possible axis, plane and center of symmetries. 2
c) What do you mean by NDT? Mention its advantages over destructive and semi-destructive testing. 2

Q.3. Attempt any two parts of the following. Q. 3(a) is compulsory.

- a) Define bel and decibel. Deduce Sabin's formula for the reverberation time of an auditorium. 4
b) The reverberation time of a cubical lecture hall of side 40 ft. is 0.8 s. If one of the walls is covered with cotton, the reverberation time is reduced to 0.6 s. Find the sound absorption coefficient of cotton. 2
c) Describe the principle and method for producing ultrasonic waves by magnetostriction method. 2

BAS-II

Roll No. **2 b 1 7 0 3 1 0 3 3**

B.Tech.

EVEN SEMESTER

MINOR EXAMINATION 2017-2018

Human Values & Professional Ethics

Time: 2 Hrs.

Max. Marks: 30

Note: Answer all questions

Q.1

Attempt any Three parts of the following. Q. 1(a) is compulsory.

- (a) Provide a brief introduction of values and explain its importance and functions. • 4
(b) List and explain at least five important human values. Are there any cross-cultural variations in values? 3
(c) Discrimination leads to acrimony in relationships! Explain. 3
(d) What is the role of value system in family harmony? How can you maintain harmony in relationship? 3

Q.2 Attempt any Three parts of the following. Q. 2(a) is compulsory.

- (a) What guiding principles should be followed while deciding the content of value education? 4
(b) Is it important to impart value education in today's scenario? If so, explain the reasons. 3
(c) What is the purpose of self-exploration? Explain it in detail. 3
(d) How would you explain happiness? Which, according to the current research, are the seven habits of happy people? 3

Q.3

Attempt any Three parts of the following. Q. 3(a) is compulsory.

- (a) List and explain the important feelings that need to be recognized and fulfilled to ensure mutual happiness in relationships? 4
(b) Which are the four orders of nature? How are they dependent on each other? 3
(c) What is Environmental Ethics and how it is relevant today? 3
(d) Define existence and show that existence is a form of co-existence. 3

Subject Code- BEE-02

Roll No. 2017031023

B. Tech. -I
ODD SEMESTER
MINOR TEST 2017 - 2018

Subject Name- Electrical Circuit Analysis

Time: 2 Hrs.

Max. Marks: 20

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

(a). Determine all mesh current as shown in figure.1;

4

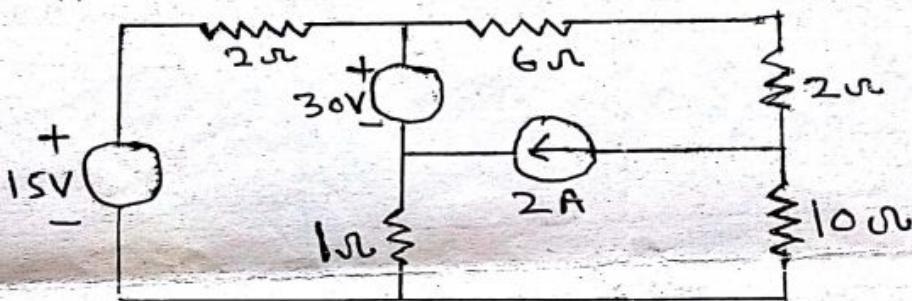


Figure.1

(b). Find the current in 6 ohm resistance using Thevenin's theorem as shown in fig. 2;

2

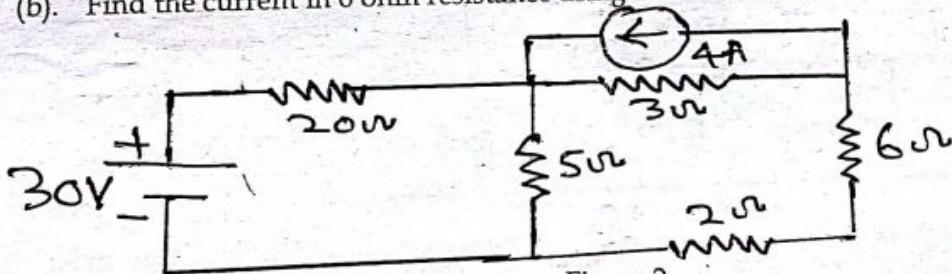


Figure.2

(c). A sinusoidal alternating has an r.m.s. value of 100 V. Find the instantaneous value 2
0.0125 second after passing through maximum value.

(d). Define the average value of a sinusoidal current. Derive an expression for the average 2
output value for a half wave rectified sinusoidal current waveform.

Q.2 Attempt any Two parts of the following. Q. 2(a) is compulsory.

(a). Define Superposition theorem and calculate current in 1 ohm resistance of figure.3 4
using Superposition theorem;

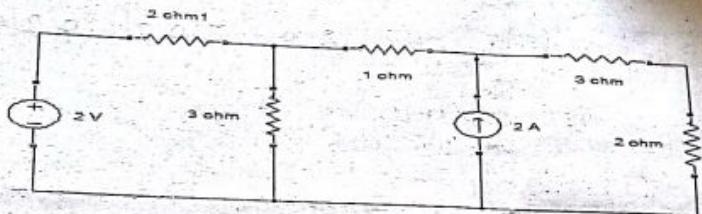


Figure.3

- (b). Find circuit shown in figure.4, what will be the value of R_L to get maximum power. 2
What maximum power delivered to the load.

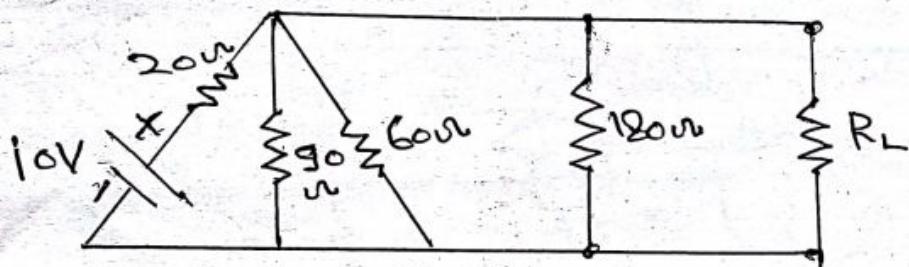


Figure.4

- (c). Find the current in each branch of the circuit of fig. 5 using Nodal analysis. 2

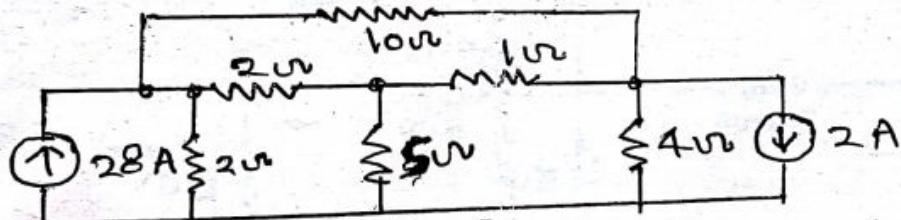


Figure.5

Q.3 Attempt any Two parts of the following. Q. 3(a) is compulsory.

- (a). Three impedances Z_1 , Z_2 and Z_3 are connected in series across 200 V, 50 Hz supply. If the $Z_1 = 20 \Omega$, $Z_2 = (8 + j10) \Omega$, $Z_3 = (15 - j15) \Omega$, determine (i) the current through the circuit, (ii) the power factor of the circuit, and (iii) the voltage across each impedance. 4
- (b). Circuits consist of 100 Ω resistors in parallel with 60 μF capacitor, and is connected to a 200 V, 50 Hz supply. Calculate (i) the branch currents and the supply current, (ii) circuit phase angle, and (iii) circuit impedance 2
- (c). Derive the expression for the resonant frequency of a parallel circuit, one branch consist of a coil inductance L and resistance R, whereas another branch of capacitor C. 2

BAS - 02

Roll No. 2017031033

Name of the Course: B. Tech-I year

Odd Semester

Minor Examination: 2017-18

Subject Name: Engineering Physics -I

Time: 2 hrs.

Note: Answer all questions.

Max. Marks: 20

Q.1 Attempt any three parts of the following. Q. 1(a) is compulsory.

- (a) What are the perceiving features of Lorentz transformations that do not appear in Galilean transformations? Show by direct application of Lorentz transformations that $x^2+y^2+z^2+w^2$ is invariant, where $w=ict$, $i=(-1)^{1/2}$ 4
- (b) What will be the apparent length of a meter stick measured by an observer at rest, when the stick is moving along its length with a velocity equal to (i) $c/2$ (ii) c 2
- (c) Explain the difference between classical statistics and quantum statistics. Write down the statistical distribution function in each case. 2
- (d) What was objective for the conduction of Davisson-Germer experiment? Using the diffraction of electrons beam show that how this experiment confirmed the de Broglie hypothesis. 2

Q.2 Attempt any two parts of the following. Q. 2(a) is compulsory.

- (a) Describe the purpose and conclusion of Michelson Morey Experiment. Find the shift in fringe in Michelson Morey Experiment, If effective length of each path is 6 meter and light has 6000 \AA wave-length? (Speed of Earth $v=3\times 10^4 \text{ m/s}$). 4
- (b) Calculate the velocity of watch when it seems to be slowed down by 1 minute in 1 hour. 2
- (c) What is relativistic energy? Obtain the expression
$$E^2=p^2c^2+m_0^2c^2$$

Q.3 Attempt any two parts of the following. Q. 3(a) is compulsory.

- (a) Set up the Schrodinger equation for a particle in an infinite potential well (one dimensional). Solve it for eigen values and eigen functions and plot the first three eigen functions ψ_1 , ψ_2 , ψ_3 and also plot probability. Find the minimum energy of an electron in eV moving in one dimension in an infinitely potential box of width 1 \AA . 4
- (b) What are the fundamental postulates of statistical Mechanics? Compare the salient features of MB, BE and FD statistics. 2
- (c) Derive the time dependent Schrodinger wave equation. Give significance of the equation. 2

BAS-06

ROLL
NO. 2 0 1 7 0 3 1 0 33

Time: 02 Hrs.

Marks: 30

B. Tech-Ist Year

ODD SEMESTER
MINOR TEST 2017-2018
SPACE SCIENCE

NOTE: ATTEMPT ALL QUESTIONS.

Q. 1: Attempt any three parts of the followings. Part (a) is compulsory.

- (a) Discuss major space missions of India. (4)
- (b) Describe the construction and function of a refracting telescope with the help of neat and clean diagrams. (3)
- (c) Write down proton-proton chain reaction inside the core of a star and explain it. (3)
- (d) Explain, why Pluto has been removed from the list of nine planets. (3)

Q. 2: Attempt any three parts of the followings. Part (a) is compulsory.

- (a) Write down three advantages of reflecting telescope over refracting ones. (4)
- (b) A telescope has a resolution of 0.1 micro radians. If its aperture is 4.5 meters, calculate the wavelength of the radiation falling on the telescope. (3)
- (c) Describe the construction and function of a Charge Coupled Device (CCD). How does it help to store permanent images of celestial objects? (3)
- (d) Describe the construction and function of Hubble's telescope. (3)

Q. 3: Attempt any three parts of the followings. Part (a) is compulsory.

- (a) Define a proto star and discuss the equilibrium inside a star. (4)
- (b) Comment on any two of the followings: (3)
 - (i) Solar Wind (ii) Solar Neutrinos (iii) Asteroids
- (c) Show that for bound orbit cases, the total energy of celestial objects have negative values. (3)
- (d) Derive Newton's law of gravitation from Kepler's laws of planetary motion. (3)

Time: 2 hrs.

Note: Answer all questions.

Max. Marks: 30

- Q.1 Attempt any three parts of the following. Q. 1(a) is compulsory.
- Find the nth derivatives of $\tan^{-1} \left(\frac{x \sin \alpha}{1-x \cos \alpha} \right)$. 4
 - If $\tan^{-1} \left(\frac{a+x}{a-x} \right)$, prove that $(x^2 + a^2)y_{n+2} + 2(n+1)x y_{n+1} + n(n+1)y_n = 0$. 3
 - If $y = [\log \{ x + \sqrt{(x^2 + a^2)} \}]^2$ prove that $(x^2 + a^2)y_{n+2} + (2n+1)x y_{n+1} + n^2 y_n = 0$ and hence evaluate (y_n) . 3
 - If $u = r^n(3 \cos^2 \theta - 1)$ satisfies $\frac{\partial}{\partial r} \left(r^2 \frac{\partial u}{\partial r} \right) + \frac{1}{\sin \theta} \frac{\partial}{\partial \theta} \left(\sin \theta \frac{\partial u}{\partial \theta} \right) = 0$, find n . 3
- Q.2 Attempt any three parts of the following. Q. 2(a) is compulsory.
- If u, v, w are the roots of the equation $(y-x)^3 + (y-y)^3 + (y-z)^3 = 0$, find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$. 4
 - If $u = f(r)$, where $r^2 = x^2 + y^2 + z^2$, show that $u_{xx} + u_{yy} + u_{zz} = f''(r) + \left(\frac{2}{r}\right) f'(r)$. 3
 - Expand $f(x, y) = \cot^{-1} xy$ about $(-0.5, 2)$ up to second degree terms and hence evaluate $f(-0.6, 2.4)$ approximately. 3
 - Find the maximum and minimum value of $\sin x \sin y \sin(x+y)$. 3

- Q.3 Attempt any three parts of the following. Q. 3(a) is compulsory.
- Test the consistency and hence, solve the following set of equations. 4

$$10y + 3z = 0$$

$$3x + 3y + 2z = 1$$

$$2x - 3y - z = 5$$

$$x + 2y = 4$$

- (b) Find the rank of the given matrix B by reducing in normal form, where 3

$$B = \begin{bmatrix} 2 & 3 & -2 & 4 \\ 3 & -2 & 1 & 2 \\ 3 & 2 & 3 & 4 \\ -2 & 4 & 0 & 5 \end{bmatrix}$$

- (c) Find 'b' such that $2x + y + 2z = 0$ $x + y + 3z = 0$ $4x + 3y + bz = 0$ has (i) 3 trivial solution (ii) Non-trivial solution. Find the non-trivial solution using matrix method.

- (d) Find the inverse of the matrix A by applying elementary transformations 3

$$A = \begin{bmatrix} 0 & 2 & 1 & 3 \\ 1 & 1 & -1 & -2 \\ 1 & 2 & 0 & 1 \\ -1 & 1 & 2 & 6 \end{bmatrix}$$

Roll No. 12 Name of the Course: B. Tech-I year
 Odd Semester
 Minor Examination: 2017-18

Subject Name: Engineering Physics -I

Time: 2 hrs.

Note: Answer all questions.

Q.1 Attempt any three pairs of the following. Q. 1(a) is compulsory.

- (a) What are the perceiving features of Lorentz transformations? Show by direct application of Lorentz transformations that do not appear in Galilean transformations? 4
- (b) What will be the apparent length of a meter stick measured by an observer at rest, when the stick is moving along its length with a velocity equal to (i) $c/2$ (ii) c . 2
- (c) Explain the difference between classical statistics and quantum statistics. Write down the statistical distribution function in each case. 2
- (d) What was objective for the conduction of Davisson-Germer experiment? 1 What hypothesis does it confirm? 1

Q.2 Attempt any two parts of the following. Q. 2(a) is compulsory.

- (a) Describe the purpose and conclusion of Michelson Morey Experiment. Find the shift in fringe, if effective length of each path is 6 m and light has 6000 Å wave-length? (Speed of Earth $v = 3 \times 10^4$ m/s). 4
- (b) Calculate the velocity of watch when it seems to be slowed down by 1 minute in 1 hour. 1
- (c) What is relativistic energy? Obtain the expression $E^2 = p^2 c^2 + m_0^2 c^4$. 1

Q.3 Attempt any two parts of the following. Q. 3(a) is compulsory.

- (a) Set up the Schrodinger equation for a particle in an infinite potential well (one dimensional). Solve it for eigen values and eigen functions and plot the first three eigen functions Ψ_1 , Ψ_2 , Ψ_3 and also plot probability. Find the minimum energy of an electron in eV moving in one dimension in an infinitely potential box of width 1 Å. 4
- (b) What are the fundamental postulates of statistical Mechanics? Compare the salient features of MB, BE and FD statistics. 2
- (c) Derive the time dependent Schrodinger wave equation. Give significance of the equation. 2

Roll No. 2 0 1 6 0 6 0 6 8

B. Tech

Year 1st Semester: 1Major Examination-2016-2017
Subject Name: Applied Engineering ChemistryTime: 3 hrs.
Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any three of the following from question 1(a) is compulsory.

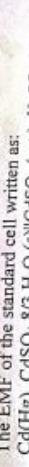
- (a) Calculate W and ΔU for the conversion of one mole of water at 100°C to steam at 1 atm pressure. Heat of vaporization of water at 100°C is 40670 J/mol .
One mole of an ideal gas (mono atomic) at 27°C expands adiabatically against a const. external pressure of 1 atm from a volume of 20 dm^3 . Calculate (i) q , (ii) W , (iii) ΔU and (iv) ΔH for this process. Assume that $C_V=3/2 R$.

(c) What is meant by efficiency of a heat engine? Derive an expression for the same.

(d) Discuss in details the phenomenon of hydrolysis of salts. Illustrate your answer taking examples of the salts of weak acid and weak base.

- (a) 20-mL of 0.2 M HCl solution is being titrated against 0.1 M solution of NaOH using a hydrogen electrode as the indicator electrode as the reference electrode. What would be the EMF of the cell initially and the after the addition of 5.0, 10.0, 19.95, 20.0, 20.05, 20.10 and 25 mL of NaOH solution.

(b) The EMF of the standard cell written as:



In which the cell reaction is

is 1.0185 V at 25°C . Calculate ΔG° , ΔS° and ΔH° for the cell reaction if $(\Delta E^\circ/\Delta T)_0$ for the cell is $5.00 \times 10^{-3} \text{ V K}^{-1}$.

(c) What is corrosion? and its types. How can it be prevented?

(d) The following kinetic data (r_0 is the initial rate) were obtained for the reaction.

Experiment	$[\text{ICl}]_0 \text{ mmol dm}^{-3}$	$[\text{H}_2] \text{ mmol dm}^{-3}$	$r_0 \text{ mol dm}^{-3} \text{ S}^{-1}$
1	1.5	1.5	3.7×10^{-7}
2	3.0	1.5	7.4×10^{-7}
3	3.0	4.5	2.2×10^{-7}
4	4.7	2.7	?

- (i) Write the rate for the reaction. (ii) from the data, determine the value of the rate constant. (iii) Use the data to predict the reaction rate for experiment 4.

Q.3 Attempt any three of the following from question 3(a) is compulsory.
(a) Complete this reaction with suitable mechanism and explain.

- (i) Nitration of Naphthalene
(ii) Nitration of Anthracene
(b) What is electrophilic substitution reaction? Discuss the reactivity and orientation of Chlorobenzene, Toluene and Nitro-Toluene on electrophile attack.
(c) Discuss the hydroxylation of alkenes (But-2-one) by syn and anti-addition with suitable reagent. Discuss the optical activity of product

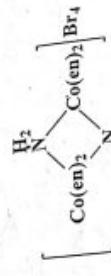
(d) Find the product A and B. Draw a suitable mechanism.



3 Marks

Q.4 Attempt any three of the following from question 4(a) is compulsory.
Draw energy level diagram and indicate the occupancy of the orbitals in 4 Marks
the following complex:

- (i) d^6 , octahedral
 - (ii) d^5 -octahedral with tetragonal distortion
 - (iii) d^3 , square planar
 - (iv) d^4 , tetrahedral
- (b) Calculate the crystal field stabilization energy for a d^4 ion such as Ni^{2+} in 3 Marks
octahedral and tetrahedral complexes. Use unit of Δ_0 in both cases. Which
is most stable?
- (c) Name of complexes of each of the following? 3 Marks
- (i) $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]$
 - (ii) $[\text{Co}(\text{NH}_3)_5\text{NO}_2](\text{NO}_3)_2$
 - (iii)



- (d) Describes and explain the Jahn-Teller effects in octahedral complexes of 3 Marks
 Cr^{2+} and Cu^{2+} .

Roll No. _____
 Name of the Course: B. Tech-I year
 Odd/Even Semester
 Minor Examination: 2017-18

Time: 2 hrs.

Note: Answer all questions.

Q.1 Attempt any three parts of the following. Q. 1(a) is compulsory.

(a) Find the nth derivatives of $\tan^{-1} \left(\frac{x \sin \alpha}{x - \cos \alpha} \right)$.

(b) If $\tan^{-1} \left(\frac{a+x}{a-x} \right)$, prove that $(x^2 + a^2)y_{n+2} + 2(n+1)x y_{n+1} + n(n+1)y_n = 0$.

(c) If $y = \left[\log \left(x + \sqrt{(x^2 + a^2)} \right) \right]^2$ prove that $(x^2 + a^2)y_{n+2} + (2n+1)x y_{n+1} + n^2 y_n = 0$ and hence evaluate y_{n+0} .

(d) If $u = r^n (3 \cos^2 \theta - 1)$ satisfies $\frac{\partial}{\partial r} \left(r^2 \frac{\partial u}{\partial r} \right) + \frac{1}{\sin \theta} \frac{\partial}{\partial \theta} \left(\sin \theta \frac{\partial u}{\partial \theta} \right) = 0$, find n.

Q.2 Attempt any three parts of the following. Q. 2(a) is compulsory.

(a) If u, v, w are the roots of the equation $(y - x)^3 + (y - z)^3 + (y - w)^3 = 0$, find $\theta(u,v,w)$.

(b) If $u = f(r)$, where $r^2 = x^2 + y^2 + z^2$, show that $u_{xx} + u_{yy} + u_{zz} = f'(r) + \left(\frac{2}{r}\right)f'(r)$.

(c) Expand $f(x, y) = \cot^{-1} xy$ about $(0.5, 2)$ up to second degree terms and hence evaluate $f(-0.6, 2.4)$ approximately.

(d) Find the maximum and minimum value of $\sin x \sin y \sin(x+y)$.

Q.3 Attempt any three parts of the following. Q. 3(a) is compulsory.

(a) Test the consistency and hence, solve the following set of equations:

$$3x + 3y + 2z = 1$$

$$2x - 3y - z = 5$$

$$x + 2y = 4$$

(b) Find the rank of the given matrix B by reducing it to normal form, where

$$B = \begin{bmatrix} 2 & 3 & -2 & 4 \\ 3 & -2 & 1 & 2 \\ 3 & 2 & 3 & 4 \\ -2 & 4 & 0 & 5 \end{bmatrix}$$

(c) Find 'b' such that $2x + y + 2z = 0$ has (i) 3 trivial solution (ii) Non-trivial solution. Find the non-trivial solution using matrix method.

(d) Find the inverse of the matrix A by applying elementary transformations

$$A = \begin{bmatrix} 0 & 2 & 1 & 3 \\ 1 & 1 & -1 & -2 \\ 1 & 2 & 0 & 1 \\ -1 & 1 & 2 & 6 \end{bmatrix}$$

Roll No. 2017031023
B. TECH.
(SEM II) EVEN SEMESTER
MAJOR EXAMINATION 2017-2018

Time: 3 Hrs. **HUMAN VALUES AND PROFESSIONAL ETHICS**

Note: Attempt all questions. Each question carry equal marks.

1. Attempt any five parts of the following:

- (a) List and explain five important human values. How values differ from morals and ethics?
(b) What should be the basic guidelines and extent/scope of value education?
(c) Do you agree that there is a need for value education in technical and professional courses? Why?
(d) How do Buddha and Socrates differ in their views on happiness?
(e) How do 'prosperity' and 'wealth' differ? What problems are we facing because of our incorrect understanding of happiness and prosperity?
(f) Explain the concepts of natural acceptance and experiential validation as mechanisms of self-exploration.
(g) Spell out and explain some important values that lie at the core of good relationships.

2. Attempt any two parts of the following:

- (a) What do you understand by ethics? What are the broad areas of ethical study?
(b) "Ethics is the science of ideal involved in human life." Considering this statement, comment on the scientific nature of ethics.
(c) How would you judge whether a human action/behavior is subject to ethical enquiry or not?

3. Attempt any two parts of the following:

- (a) What are the various divergent views that exist on the linkages of religion and ethics?
(b) Why it is important for the scientific community to address the ethical concerns emanating from their research? Explain it with specific reference to research on embryonic stem cells and GM crops.
(c) What are the various factors that render actions nonhuman and therefore not subject to scrutiny in ethics?

4. Attempt any two parts of the following:

- (a) What are the important elements of Professional Ethics?
(b) Explain the Virtue approach, the Fairness approach and the Common Good approach to ethical decision making.
(c) Compare the Theistic and Atheistic approaches of ethics.

Roll No. | 2 | 0 | 1 | 1 | 0 | 3 | 1 | 0 | 2 | 9

D B T

5. Attempt any two parts of the following: (Q x 5 = 10)
What are the three basic principles that guide activities covered under Corporate Social Responsibility?

- (a) What are the three basic principles that guide activities covered under Corporate Social Responsibility?
- (b) What is Corporate Ethics? Explain its meaning, sources, and importance.
- (c) What are the basic tenets of IEEE Code of Ethics for Engineers?

6
PC
B

Roll No.	2	0	1	7	0	3	1	0	2	3
----------	---	---	---	---	---	---	---	---	---	---

B.Tech. (C.E.)
 (SEM-II) EVEN SEMESTER
 MAJOR EXAMINATION 2017-2018

FUNDAMENTALS OF MECHANICAL ENGINEERING

Time: 3 Hrs.

Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any FIVE parts of the following:

- (5x2=10)
 a) Give Kelvin-Planck and Clausius statements of second law of thermodynamics. Justify that violation of Kelvin-Planck statements leads to violation of Clausius statements and vice-versa.

- b) Mention the difference between water tube and fire tube boilers.
 c) A closed vessel contains 3 kg of CO₂ at pressure 70 kPa and temperature 300K. Heat is supplied to the vessel till the gas attains 140 kPa of pressure. Calculate the (a) final temperature (b) work done on or by the gas (c) change in internal energy.

- d) Compare two stroke and four stroke engine on the basis of performance, efficiency and economy of operation?

- e) How active sensors & transducers are different from passive one, explain with suitable applications?

- f) A sine bar has a length of 250mm. Each roller has a diameter of 20mm. During taper angle measurement of the component the height from the surface plate to the center of roller is 100 mm. calculate the taper angle in degree.

- g) Classify the different non-ferrous metals and alloys? Write the composition, properties and applications for an alloy that used to fabricate window frames specifically.

(2.5x2=10)
Q.2 Attempt any TWO parts of the following:

- a) What is Hooke's Law? Derive the Generalized Hooke's law and also explain stress-strain diagram for mild steel.
 b) A steel wire 2 m long and 3mm in diameter is extended by 0.75 mm due to weight suspended from the wire. If the same weight is suspended from the brass wire 2.5 m long and 2mm in diameter, it is elongated by 4.65mm. Determine the modulus of elasticity of brass if that of steel is 2×10^5 MPa.

- c) Explain any two of the following:

- Derive an expression for strain energy stored in a body, when the load is applied axially.
- Creep and Fatigue failure of materials.
- Ductile and Brittle fracture.

Q.3 Attempt any TWO parts of the following:

(2x5=10)

- a) The bar shown in Figure 1 is subjected to an axial pull of 150kN. Determine diameter of the middle portion, if stress there is limited to 12 N/mm^2 . Proceed to determine the length of this middle portion if total extension of the bar is specified as 0.15mm. Take modulus of elasticity of bar material is specified as $2 \times 10^5 \text{ MPa}$.

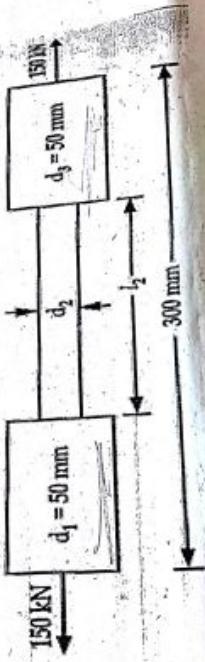


Figure 1

- b) If a mild steel material is to be used for an automotive application, how will you measure the hardness of the materials? Explain at least two methods that are widely used with suitable

Diagrams, formula and related terminology.

- c) If E, G and K denotes Young's modulus, modulus of rigidity and Bulk modulus respectively for an elastic material. Find the Poisson's ratio for elastic material when $K=E$.

Q.4 Attempt any TWO parts of the following:(2x5=10)

- a) Calculate the values and draw the diagrams for shear force and bending moment for the following beam shown in Figure 2.

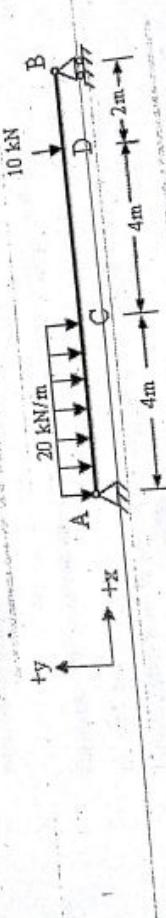


Figure 2

- b) Define a beam. Explain the different types of beams in detail with suitable applications.
- c) What is the difference in between Sagging and Hogging? Also, explain the different types of supports that used in beams.

Q.5 Attempt any TWO parts of the following:

- a) A rolled sheet joint of I - section with dimensions shown in Figure 3. The beam has a span of 10 m and carries uniformly distributed load of intensity 50KN/mrun for the entire span. Make calculations for the stress produced due to bending.

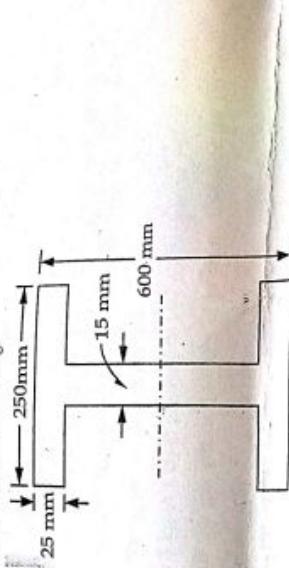


Figure 3

- b) A solid shaft is subjected to a maximum torque of 15MN-cm. Determine the diameter of the shaft, if the allowable shear stress and the twist are limited to 1 kN/cm^2 and 1° , respectively 210 cm length of shaft. $G=8 \text{ MN/cm}^2$.

- c) Derive the Bending equation with its all assumptions?

Roll No. **2017031033**

B. Tech. Iyr

**MAJOR EXAMINATION
EVEN SEMESTER
Professional Communication
2017 - 2018**

Time: 3 Hrs.

Note: Attempt all questions.

1. Attempt any five parts of the following.

- (a) What is communication? Describe the functions of communication. $(5 \times 2 = 10)$
- (b) A good writer is not necessarily a good speaker. Explain
- (c) What are seven Cs? Discuss at least two of them.
- (d) What is inductive order of writing a paragraph? How is it different from deductive order? Explain with examples
- (e) What is listening comprehension? Suggest tips to enhance listening skill.
- (f) Do as directed in the brackets:
- (i) When not yet five, his father began daily batting practice with his son in his courtyard. (Rewrite after removing awkward construction)
 - (ii) My bag containing a mobile phone, two books and three pens were lost yesterday./ rewrite, after making corrections, if any)
 - (iii) Strikes are started by a few students which are not interested in his work.(Correct the sentence)
 - (iv) I aimed my gun at the tiger. (Change the sentence into passive voice)
- (g) Give some tips to improve and enhance reading skill.
2. Attempt any two parts of the following:
- (a) What is difference between a thesis and a research paper? Throw light on the essential features of good research paper. $(2 \times 5 = 10)$
- (b) Prepare on project report on "The future of Animation in Indian Film Industry".
- (c) What is difference between solicited and unsolicited proposal? Write a technical proposal to the head of your organization for renovation of mess in your hostel. Invent the necessary details.

3. Attempt any two parts of the following:

(a) How personal letters are different from business letters?

(2x 5 = 10)
constitute a letter? Describe

(b) You wish to purchase a laptop for your personal work. Write a letter of enquiry to the supplier of laptop asking for prices and other terms and conditions for its safe delivery. Invent the required details.

You have seen an advertisement in a leading newspaper asking young graduates to apply for assistant manager in a reputed multinational company. Mail your C.V. and invent the necessary details.

4. Attempt any two parts of the following:

(a) What is a good speech? Explain its features.

(2x 5 = 10)
(b) Audience analysis and locales are very important from a presenter's point of view during

Speech.

(c) What major points should a person bear in mind while appearing for interview? Discuss

5. Attempt any two parts of the following: (2x5=10)

(a) What is audio-visual aids? List the essential visual aids for effective presentation.

(b) What do you understand by time management? Discuss its role in effective presentation.

(c) What is body language? Write a note on its advantages and limitations during oral presentation.

Roll No.

2	0	1	7	0	3	4	0
---	---	---	---	---	---	---	---

B. Tech.

(SEM II) ODD SEMESTER

MAJOR EXAMINATION 2017-18

Engineering Physics II

Time: 3 Hrs.

- Note: Attempt all questions. Each question carries equal marks.
- Q.1** Attempt any five parts of the following.
- (a) Define the following terms in crystal structure

(i) Space lattice, (ii) Basis (iii) Primitive cell (iv) Unit cell

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

(c) Explain packing factor in cubic lattices? Describe the ways in which crystal may have closest packing of atoms.

(d) Discuss Laue's principle of X-ray diffraction and obtain the diffraction condition for a simple cubic lattice.

(e) Find the reverberation time of an office which has volume of 3000 m^3 and a total sound absorption of 75 metric sabine. Estimate the additional sound absorption required for an optimum reverberation.

(f) What steps would you take to improve the acoustics of hall? Explain with reason.

(g) What is Non-Destructive Testing (NDT)? What are the factors affecting the choice of NDT method.

- Q.2** Attempt any two parts of the following:
- (a)

State Ampere's circuital law and discuss why and how it was modified to include the displacement current. Comment on the statement "The addition of displacement current resulted into unification of electrical and magnetic phenomena."

$$\oint \mathbf{B} \cdot d\mathbf{l} = \mu_0 I + \mu_0 \epsilon_0 \frac{d\phi}{dt}$$

Q.3

- (a) Write down Maxwell's equation in integral form and convert them into differential form. Give physical significance of each equation.

- (b) Deduce the equation of the propagation for the plane electromagnetic wave in free space. Show that the electric and magnetic vectors are normal to each other as well as to the direction of propagation of the wave.

Q.3 Attempt any two parts of the following:

- (a) Derive electromagnetic wave equation in dielectric medium and discuss its solution. (2 x 5 = 10)

- (b) Write down Maxwell's equation in a conducting medium and show that the electric and magnetic field strength will decrease exponentially with the distance from the surface into the conducting medium.

- (c) Show that for frequency $\leq 10^8$ Hz, a sample of silicon will act like a good conductor. For silicon, one may assume $\frac{\epsilon}{\epsilon_0} = 12$ and $\sigma = 2$ mhos/cm. Also calculate the penetration depth for this sample at frequency 10^8 Hz.

Q.4 Attempt any two parts of the following:

- (a) How are the conductors, semiconductors and insulators distinguished based on energy band theory? Show how the theory explains the temperature dependence of electrical conductivity of a semiconductor?

- (b) Find the expression for drift and diffusion current densities in semiconductors. Show that in n-type semiconductors Fermi level lies in the middle of donor level and bottom of the conduction band.

- (c) What are Type I and Type II Superconductors? Describe, in brief, BCS theory of superconductivity.

Q.5 Attempt any two parts of the following:

- (a) What do you mean by superconductivity? Describe the effect of the following on the superconducting properties (i) Magnetic field (ii) Temperature (iii) Isotopes

- (b) Explain the reason for the drastic change in the properties of materials at nanoscale. Discuss the structure and properties of carbon nano tubes.

- (c) Calculate the drift velocities of holes and electrons in (i) silicon and (ii) germanium at 300K when applied electric field is 60volt/cm. Take $\mu_p = 500 \text{ cm}^2/\text{Vs}$ and $\mu_n = 1500 \text{ cm}^2/\text{Vs}$ for silicon and $\mu_h = 3700 \text{ cm}^2/\text{Vs}$ and $\mu_n = 3600 \text{ cm}^2/\text{Vs}$ for germanium.

Ti
No
I.B.Tech.
Year: 1st Semester: 2nd
Major Examination: 2017-18
Engineering Mathematics: II

Note: Attempt all questions. Each question carries equal marks.

Roll No. 2017031032

5*2=10

Q. 1 Attempt any five parts of the following:

- (a) Solve, $(D^2 + 3D + 2)y = xe^{-x}$.
- (b) Solve, by the variation of parameters $(D^2 - 1)y = e^{-2x} \sin e^{-x}$.
- (c) Solve, $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 4y = 4x^2 - 6x^3$, $y(2) = 4$, $y'(2) = -1$.
- (d) Solve, $\frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + (x^2 + 2)y = e^{\frac{1}{2}(x^2+2x)}$.
- (e) Show that $\int_1^1 (x^2 - 1)P_{n+1}P_n' dx = \frac{2n(3n+1)}{(2n+1)(2n+3)}$.
- (f) Show that $\int J_S(x)dx = -J_2 - \frac{2}{\pi} J_1$.

Q. 2 Attempt any two parts of the following.

(a) Find the Laplace transform of

$$f(t) = \begin{cases} t, & 0 < t < a \\ 2a - t, & a < t < 2a \end{cases} \text{ where } f(t+2a) = f(t).$$

- ii. Find the Laplace transform $f(t) = \frac{\sin at}{t}$. Does the Laplace transform of $\cos at$ exist?

(b) i. Find the Laplace of the following function by representing it in terms of unit step function

$$f(t) = \begin{cases} t-1, & 1 < t < 2 \\ 3-t, & 2 < t < 3 \end{cases}$$

- ii. Evaluate the following integrals using Laplace transform
- $$\int_0^\infty \frac{e^{-t} \sin^2 t}{t^2} dt, \int_0^\infty e^{-2t} t \sin 3t dt.$$

(c) Find the inverse Laplace transform of

$$\text{i. } \frac{Cs^2 + Ds + E}{s - s}, \quad \text{ii. } \frac{e}{s^4 + 4a^4}.$$

Q. 3 Attempt any two parts of the following.

- (a) Solve the following differential equation using Laplace transform
 $x'' + 9x = \cos 2t$, if $x' = \frac{dx}{dt}$, $x(0) = 1$ and $x\left(\frac{\pi}{2}\right) = -1$.
- (b) Solve, $t \frac{d^2x}{dt^2} + \frac{dx}{dt} + tx = 0$, $x'(0) = 1$, $x''(0) = 0$ using Laplace transform.
- (c) (i) Solve the following simultaneous differential equations using Laplace transform
 $\frac{dx}{dt} - y = e^t$, $\frac{dy}{dt} + x = \sin t$, given $x(0) = 0 = y(0)$.
(ii) Solve the integral equation
 $y'(t) = t + \int_0^t y(t-u) \cos u du$, $y(0) = 4$.

Q. 4 Attempt any two parts of the following.

- (a) Find the Fourier series of the function $f(x) = x^2$, $0 < x < \sqrt{a}$

Hence find the value of

- i. $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2}$,
ii. $\sum_{n=1}^{\infty} \frac{1}{n^2}$ and
iii. $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}$.

- (b) Obtain the Fourier series for

$$f(x) = \begin{cases} x, & -1 < x \leq 0 \\ x+2, & 0 < x < 1 \end{cases}$$

Hence, deduce the sum of $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$.

- (c) (i) Solve: $(D^2 + DD' - 6D^2)y = x^2 \sin(x+y)$.
(ii) Find a real function V of x and y , reducing to zero when $y = 0$ and satisfying $\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} + 4\pi(x^2 + y^2) = 0$.

2*5=10

Q. 5 Attempt any two parts of the following.

- (a) (i) Solve, $(D^2 + 4DD' - 5D^2)z = 2\cos y - x\sin y$.
(ii) Solve, $(D^2 - 2DD' + D^4)z = x^2y^2e^{x+2y}$.
- (b) (i) Solve: $(r + 2s + t + 2p + 2q + 1)z = \cos mx \cos nx + \sqrt{x+y}$.
(ii) Solve, $(D^2 - D^2)z = e^{x-y} \sin(2x + 3y)$.
(c) Find the half range sine series for $f(x) = x(\pi - x)$ in the interval $(0, \pi)$ and deduce $\frac{1}{3^3} - \frac{1}{5^3} + \frac{1}{7^3} - \dots = \frac{\pi}{32}$.

Time: 3 Hrs.

Note: Attempt all questions. Each question carry equal marks.

1. Attempt any four parts of the following:

- (a) Show that the massless particles can exist only if they move with speed of light and their energy E and momentum p must have the relation $E = pc$.
 (4× 2.5 = 10)

(b) Obtain the relativistic form of Newton's second law, when force (F) is parallel to v.

(c) Describe the postulates of Statistical Mechanics

(d) How much does a proton gain in mass when accelerated to a kinetic energy of 500 MeV?

(e) Find the speed of 0.1 MeV electrons according to the classical and relativistic mechanics.

(f) Using the postulates of special theory of relativity derive the Lorentz transformation equations.
 (2× 5 = 10)

2. Attempt any two parts of the following:

- (a) What was the objective of Davison-Germer experiment? Discuss the results of this experiment.
 (b) An electron is confined to move between two rigid walls separated by 1 Å^0 . Find the de Broglie wavelength representing the first three allowed energy states of the electron and their corresponding energies.

(c) Derive Maxwell-Boltzman Distribution law for N number of distinguished particles.
 (2× 5 = 10)

3. Attempt any two parts of the following:

- (a) Explain the construction and working of Huygens eyepiece. Locate the positions of cardinal points with suitable depiction.
 (b) Derive an expression for the intensity distribution due to Fraunhofer diffraction at a single slit and show that the intensity of the first subsidiary maximum is about 4.5% of that of the principal maximum.

(c) Discuss the production and detection of linearly, circularly and elliptically polarized light.
 (2× 5 = 10)

4. Attempt any two parts of the following:

- (a) Describe the phenomena of interference due to wedge-shaped thin film obtain the conditions of maxima and minima also find the expression for fringe width.
 (b) Define phase velocity and group velocity. Show that the group velocity is always equal to the particle velocity.
 (c) An electron has de Broglie wavelength $2 \times 10^{-12} \text{ m}$. Find its kinetic energy. Also, find the phase and group velocities of its de Broglie waves.

- (2× 5 = 10)
- Attempt any two parts of the following:**
5. What are the essential requirement for laser? Explain the construction and working of He-Ne Laser with suitable diagram.
- (a) An optical fibre has an NA of 0.20 and a cladding refractive index of 1.59. Determine angle for the fibre in water, which has refractive index of 1.33.
- (b) Explain the light propagation in an optical fibre.
- (c) Discuss the construction and reconstruction of image with the help of hologram.

BAS | 06

Roll. No.

2 | 0 | 1 | 7 | 0 | 3 | 1 | 0 | 3 | 3

B.Tech. I
ODD SEMESTER
MAJOR EXAMINATION-2017-2018
Space Science

Time: 03Hrs.

Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any four parts of the following:

- (a) Draw neat and clean sketches of reflecting type of telescopes. Discuss its advantages over refracting ones. (4×2.5)
- (b) Describe the construction and function of Charge Coupled Device (CCD). Highlight its importance in imaging of distant celestial objects.
- (c) Write nuclear reactions inside Sun. How were the solar neutrinos detected?
- (d) Explain the construction and function of X-rays telescopes. Why are the X-rays collected at small glancing angles?
- (e) If the kinetic energy of an asteroid falling towards Earth exceeds its gravitational energy, show that its orbit will be necessarily unbounded.
- (f) The force acting on a planet is given by the following equation-
- $$f = -\frac{l^2 u^2}{m} \left(\frac{d^2 u}{d\theta^2} + u \right)$$
- Here, the terms have their usual meanings. If $r = \frac{p}{(1+\epsilon \cos\theta)}$; then show that the force obeys the inverse square law. (\square and p are constants)

Q.2 Attempt any two parts of the following: (2×5)

- (a) Draw neat and clean sketch of our galaxy Milkyway and explain its morphology. Show the position of our solar system in it.
- (b) Draw Hubble's tuning fork diagram and explain morphological evolution of galaxies.

(c) Why do "Pulsars" emit radiation? Explain with the help of neat and clean diagram.

Q.3 Attempt any two parts of the following:

(a) Classify dwarf stars on the basis of Chandrasekhar limit and explain their equilibrium.

(b) Draw neat and clean Hertzsprung-Russell (HR) diagram and explain the life cycle of star with

mass $1.8 M_{\odot}$ in it.

(c) Account reasons for the existence of black hole.

Q.4 Attempt any two parts of the following:

(a) Write notes on dark matter and dark energy? Give evidence in favor of their existence.

(b) Define the terms "Big-Bang" and "Big-Crunch" and describe the related evolution of the Universe.

(c) Starting from the Friedmann's equation, obtain the condition for flat model of the Universe and explain it.

Q.5 Attempt any two parts of the following:

(a) Describe Hubble's law of expanding Universe. How does it indicate for Big-Bang in remote past of the Universe?

(b) Explain different stages of evolution of the Universe with the help of neat and clean diagram.

(c) Comment on term "Cosmic Shower".

Roll No.

2	0	1	7	0	4	L	0	9	+
---	---	---	---	---	---	---	---	---	---

B. Tech.

(SEM II) ODD SEMESTER

MAJOR EXAMINATION 2017-18

Engineering Physics II

Time: 3 Hrs.

Note: Attempt all questions. Each question carries equal marks.
Q.1 Attempt any five parts of the following.

Max. Marks: 50

- (a) Define the following terms in crystal structure (5 x 2 =10)
- (i) Space lattice, (ii) Basis (iii) Primitive cell (iv) Unit cell
- (b) Obtain the Miller indices of a plane which intercepts at a , $b/2$, $3c$ in a simple cubic unit cell. Draw a neat diagram showing the plane.
- (c) Explain packing factor in cubic lattices? Describe the ways in which crystal may have closest packing of atoms.
- (d) Discuss Laue's principle of X-ray diffraction and obtain the diffraction condition for a simple cubic lattice.
- (e) Find the reverberation time of an office which has volume of 3000 m^3 and a total sound absorption of 75 metric sabine. Estimate the additional sound absorption required for an optimum reverberation.
- (f) What steps would you take to improve the acoustics of hall? Explain with reason.
- (g) What is Non-Destructive Testing (NDT)? What are the factors affecting the choice of NDT method.

Q.2 Attempt any two parts of the following: (2 x 5 =10)

- (a) State Ampere's circuital law and discuss why and how it was modified to include the displacement current. Comment on the statement "The addition of displacement current resulted into unification of electrical and magnetic phenomena."

- (b)** Write down Maxwell's equation in integral form and convert them into differential form. Give physical significance of each equation.
- (c)** Deduce the equation of the propagation for the plane electromagnetic wave in free space. Show that the electric and magnetic vectors are normal to each other as well as to the direction of propagation of the wave.

Q.3 Attempt any two parts of the following:

- (a)** Derive electromagnetic wave equation in dielectric medium and discuss its solution. (2 x 5 = 10)
- (b)** Write down Maxwell's equation in a conducting medium and show that the electric and magnetic field strength will decrease exponentially with the distance from the surface into the conducting medium.
- (c)** Show that for frequency $\leq 10^9$ Hz, a sample of silicon will act like a good conductor. For silicon, one may assume $\frac{\epsilon}{\epsilon_0} = 1.2$ and $\sigma = 2$ mhos/cm. Also calculate the penetration depth for this sample at frequency 10^6 Hz.

Q.4 Attempt any two parts of the following:

- (a)** How are the conductors, semiconductors, and insulators distinguished based on energy band theory? Show how the theory explains the temperature dependence of electrical conductivity of a semiconductor?
- (b)** Find the expression for drift and diffusion current densities in semiconductors. Show that in n-type semiconductors Fermi level lies in the middle of donor level and bottom of the conduction band.
- (c)** What are Type I and Type II Superconductors? Describe, in brief, BCS theory of superconductivity.

Q.5 Attempt any two parts of the following:

- (a)** What do you mean by superconductivity? Describe the effect of the following on the superconducting properties (i) Magnetic field (ii) Temperature (iii) Isotopes
- (b)** Explain the reason for the drastic change in the properties of materials at nanoscale. Discuss the structure and properties of carbon nano tubes.
- (c)** Calculate the drift velocities of holes and electrons in (i) silicon and (ii) germanium at 300K when applied electric field is 60 volt/cm. Take $\mu_p = 500 \text{ cm}^2/\text{Vs}$ and $\mu_n = 1500 \text{ cm}^2/\text{Vs}$ for silicon and $\mu_h = 3700 \text{ cm}^2/\text{Vs}$ and $\mu_n = 3600 \text{ cm}^2/\text{Vs}$ for germanium.

B. Tech.
 Year: 1st Semester: 2nd
 Major Examination: 2017-18
 Engineering Mathematics: II

Note: Attempt all questions. Each question carries equal marks.

Q. 1 Attempt any five parts of the following:

5*2=10

- (a) Solve, $(D^2 + 3D + 2)y = xe^x \sin x$.
- (b) Solve, by the variation of parameters $(D^2 - 1)y = e^{-2x} \sin e^{-x}$.
- (c) Solve, $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 4y = 4x^2 - 6x^3, y(2) = 4, y'(2) = -1$.
- (d) Solve, $\frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + (x^2 + 2)y = e^{\frac{1}{2}(x^2+2x)}$.
- (e) Show that $\int_1^1 (x^2 - 1)P_{n+1}P'_n dx = \frac{2n(n+1)}{(2n+1)(2n+3)}$.
- (f) Show that $\int J_3(x)dx = -J_2 - \frac{2}{x}J_1$.

(g) Solve, $xy' - 3y = k$ where k is a constant using power series method.

Q. 2 Attempt any two parts of the following:

2*5=10

- (a)
 - i. Find the Laplace transform of $f(t) = \begin{cases} t, & 0 < t < a \\ 2a - t, & a < t < 2a \end{cases}$ where $f(t+2a) = f(t)$.
 - ii. Find the Laplace transform $f(t) = \frac{\sin at}{t}$. Does the Laplace transform of $\frac{\cos at}{t}$ exist?

(b)

- i. Find the Laplace of the following function by representing it in terms of unit step function
 $f(t) = \begin{cases} t-1, & 1 < t < 2 \\ 3-t, & 2 < t < 3 \end{cases}$
 - ii. Evaluate the following integrals using Laplace transform
 $\int_0^\infty \frac{e^{-t} \sin^2 t}{t^2} dt, \int_0^\infty e^{-2t} t \sin 3t dt$.

(c) Find the inverse Laplace transform of

- i. $\frac{As+B}{Cs^2+Ds+E}$.
- ii. $\frac{e^{-s}}{s^4+4a^4}$.

Q. 3 Attempt any two parts of the following.

(a) Solve the following differential equation using Laplace transform
 $x'' + 9x = \cos 2t$, if $x' = \frac{dx}{dt}$, $x(0) = 1$ and $x\left(\frac{\pi}{2}\right) = -1$. 2*5=10

(b) Solve, $t \frac{d^2x}{dt^2} + \frac{dx}{dt} + tx = 0$, $x(0) = 1$, $x'(0) = 0$ using Laplace transform. 2*5=10

(c) (i) Solve the following simultaneous differential equations using Laplace transform
 $\frac{dx}{dt} - y = e^t$, $\frac{dy}{dt} + x = \sin t$, given $x(0) = 0 = y(0)$.
(ii) Solve the integral equation
 $y'(t) = t + \int_0^t y(t-u) \cos u du$, $y(0) = 4$.

Q. 4 Attempt any two parts of the following.

(a) Find the Fourier series of the function $f(x) = x^2$. 2*5=10

Hence find the value of

i. $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2}$,

ii. $\sum_{n=1}^{\infty} \frac{1}{n^2}$ and

iii. $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}$.

$-5 \leq x \leq 5$

(b) Obtain the Fourier series for

$$f(x) = \begin{cases} x, & -1 < x \leq 0 \\ x+2, & 0 < x < 1 \end{cases}$$

Hence, deduce the sum of $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} \dots \dots \dots$

(c) (i). Solve: $(D^2 + DD' - 6D^2)y = x^2 \sin(x+y)$.

(ii). Find a real function V of x and y , reducing to zero when $y = 0$ and satisfying $\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} + 4\pi(x^2 + y^2) = 0$.

Q. 5 Attempt any two parts of the following.

2*5=10

(a) (i) Solve, $(D^2 + 4DD' - 5D'^2)z = 2\cos y - x\sin y$.
(ii) Solve, $(D^2 - 2DD' + D'^2)z = x^2 y^2 e^{x+2y}$.

(b) (i) Solve: $(r + 2s + t + 2p + 2q + 1)z = \cos mx \cos nx + \sqrt{x+y}$.

(ii) Solve, $(D^2 - D'^2)z = e^{x-y} \sin(2x+3y)$.

(c) Find the half range sine series for $f(x) = x(\pi - x)$ in the interval $(0, \pi)$ and deduce $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} + \dots = \frac{\pi}{32}$.

Printed Pages: 2

BAS-05

Roll No. 2017061048

B. Tech.
(SEM II) EVEN SEMESTER
MAJOR EXAMINATION 2017 - 2018

Environment & Ecology

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. All questions carry equal marks.

Q.1 Attempt any five parts of the following.

(5×2=10)

- ✓(a). Explain the scope and importance of environmental studies.
- ✓(b). Unawareness about the protection of environment will lead to detrimental consequences: comment with illustrations.
- ✓(c). Explain the roles of producers, consumers, and decomposers in an ecosystem.
- ✓(d). What are mineral resources? What are the harmful effects of extraction of minerals?
- ✓(e). Describe the structure, salient features, and function of a forest ecosystem.
- ✓(f). Discuss important world food problems? What are the characteristics of a healthy food?
- ✓(g). Explain the term "biodiversity". Give the reasons for the extinction of species.

Q.2 Attempt any two parts of the following.

(2×5=10)

- ✓(a). What is water pollution? Discuss the effect of i) sewage and ii) agricultural discharges on water.
- ✓(b). What is soil pollution? What are its harmful effects? Discuss the methods of controlling soil pollution.
- ✓(c). Define air pollution. Suggest measures for controlling air pollution. Explain the working of any one device used for controlling air pollution.

(2×5=10)

Q.3 Attempt any two parts of the following.

- ✓(a). Define noise. Discuss various sources of noise. What are its effects? Describe the methods used for controlling noise pollution.

- ✓ (b). What are solid wastes and what are their different types? Name various methods of waste disposal and explain any one of them.

- ✓ (c). Write a short note on global warming explaining its reasons and consequences.

Q.4 Attempt any two parts of the following.

(2×5=10)

- ✓ (a). What are NGOs? Write about the work done by any two Indian NGOs towards environmental protection.

- (b). The growth of human population took place at a very fast rate in 19th and 20th centuries – why? Are we successful in curtailing this growth rate now? Elaborate.

- ✓ (c). How environmental awareness can be inculcated in public? Discuss the role of an individual in prevention of pollution.

Q.5 Attempt any two parts of the following.

(2×5=10)

- (a). Briefly discuss the salient features of Environment (Protection) Act, 1986.

- ✓ (b). Explain the term "population explosion". What are its effects on environment and other human aspects?

- ✓ (c). Write the aims and objectives of "family welfare programs". Discuss their implementation details.

(SEM II) ODD SEMESTER
MAJOR EXAMINATION 2017-18
Engineering Physics II

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any five parts of the following.

(5 x 2 = 10)

- (a) Define the following terms in crystal structure
(i) Space lattice, (ii) Basis (iii) Primitive cell (iv) Unit cell
- (b) Obtain the Miller indices of a plane which intercepts at a , $b/2$, $3c$ in a simple cubic unit cell. Draw a neat diagram showing the plane.
- (c) Explain packing factor in cubic lattices? Describe the ways in which crystal may have closest packing of atoms.
- (d) Discuss Laue's principle of X-ray diffraction and obtain the diffraction condition for a simple cubic lattice.
- (e) Find the reverberation time of an office which has volume of 3000 m^3 and a total sound absorption of 75 metric sabine. Estimate the additional sound absorption required for an optimum reverberation.
- (f) What steps would you take to improve the acoustics of hall? Explain with reason.
- (g) What is Non-Destructive Testing (NDT)? What are the factors affecting the choice of NDT method.

Q.2 Attempt any two parts of the following:

(2 x 5 = 10)

- (a) State Ampere's circuital law and discuss why and how it was modified to include the displacement current. Comment on the statement "The addition of displacement current resulted into unification of electrical and magnetic phenomena."

Printed Pages: 1

BAS-12

Roll No. 2014061048

B. TECH.
(SEM II) EVEN SEMESTER
MAJOR EXAMINATION 2017-2018

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carry equal marks.

1. Attempt any five parts of the following:

- (a) Briefly explain the extent of subject matter dealt by industrial psychology. (5 x 2 = 10)
(b) Write a brief note on Motion study highlighting its advantages, and disadvantages.
(c) What were the four phases of experiments carried out by the Hawthorne Research Group?
 (d) Critically evaluate the Charismatic Leadership Theory.
(e) How did J. Stacy Adams and Victor Vroom explain the concept of Motivation?
 (f) What are the various potential sources of stress in our lives?
 (g) What purpose does Organizational Culture serve and how to create and sustain it?

2. Attempt any two parts of the following: (2 x 5 = 10)

- (a) Define Engineering Psychology and explain its objectives. What are the various methods used in Engineering Psychology research?
(b) Which features you would look for in a psychological test to judge its authenticity/ credibility?
 (c) What standard process you would follow to compose the description and specification of a job?

3. Attempt any two parts of the following: (2 x 5 = 10)

- (a) "The process of recruitment is subject to influence of various internal and external factors." Comment.
(b) Suppose you are heading the HR department of an organization. How would you go about conducting recruitment in your organization?
 (c) Define fatigue, explain its symptoms and effects. What possible measures could be taken to address the problem of fatigue at workplace?

4. Attempt any two parts of the following: (2 x 5 = 10)

- (a) What are the various methods of performance appraisal that intend to identify one's relative standing in comparison to others in a group of people being evaluated?
 (b) Which are the four common methods of performance appraisal that specify precise measurement standards?
(c) How an organization can maintain organization-job-employee characteristic match? Also, explain the 360° appraisal process.

5. Attempt any two parts of the following: (2 x 5 = 10)

- (a) What are possible ways to ensure that the training programme designed by you is effective?
 (b) What are the various methods of training employees in an organization? How apprenticeship differs from internship?
(c) Define development and explain its objectives. How training and development differ?

BAS-05

Roll No.

2017091042

B. Tech.
EVEN SEMESTER
MINOR TEST 2017 - 2018

Environment & Ecology

Time: 2 Hrs.

Max. Marks: 30

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

- (a). Explain why any study of environment becomes an interdisciplinary one. 4
- (b). What are the sources of our food? Is there enough food in the world for all? 3
- (c). What is the concept of food chain? Explain different types of food chains giving suitable examples. 3
- (d). Distinguish among genetic biodiversity, species biodiversity and ecosystem biodiversity. 3

Q.2 Attempt any Three parts of the following. Q. 2(a) is compulsory.

- (a). Discuss the importance of forests. What are the economical aspects of forests? 4
- (b). How do the modern agricultural methodologies effect the environment? 3
- (c). Describe the merits, limitations and uses of solar energy. 3
- (d). Describe the advantages and disadvantages of constructing a dam. Do the benefits of constructing bigger dams outweigh their risks- discuss? 3

Q.3 Attempt any Three parts of the following: Q. 3(a) is compulsory.

- (a). Define "trophic level" and explain its sense. 4
- (b). Describe the structure, salient features, and functions of a pond ecosystem. 3
- (c). What is meant by biodiversity? What are various human actions responsible for the extinction of species? 3
- (d). Write an explanatory note on "conservation of biodiversity". Give two basic approaches for wildlife conservation. 3

B. Tech.
 Odd ~~Year~~ 1st Semester 1st
 Major Examination 2017-2018
FUNDAMENTALS OF ELECTRONICS ENGINEERING

Time: 3 Hours

M.M.: 50

Note: - Attempt all the questions.

1. Attempt any four parts of the following. (4x2.5) 10
- (a) Prove that reverse saturation current in semiconductor doubles for every rise of 10°C in temperature.
For what voltage will the reverse current in a p-n junction Ge diode reach 90% of its saturation value at room temperature?
 - (b) Draw the static characteristics of n-p-n transistor in CE configuration. Indicate different regions of operation what happens if transistor turns into saturation regions?
 - (c) What is the significance of load line & operating point? Why operating point shifts? Mention the points to be considered for selection of operating point.
 - (d) Explain the operation of p-channel JFET. Draw its Drain and transfer characteristics and indicate different regions. What is pinch off in JFET?
 - (e) Draw the structure of n-channel EMOSFET. Explain its working with characteristics. What is V_T ?
 - (f) Draw the self Bias circuit of N-channel JFET. Calculate the value of R_s required to self bias and N channel JFET with $I_{DSS} = 40\text{mA}$, $V_F = -10\text{V}$, and $V_{GSQ} = -5\text{V}$.
2. Attempt any two parts of the following. (2x5)=10
- (a) Prove that NAND and NOR gates are universal logic gates.
 - (b) Draw the circuit diagram of OP-AMP as summer and obtain the output expression.
 - (c) Explain the terms regarding an OP-AMP.
 - (i) Input offset current
 - (ii) Input Bias current
 - (iii) Slew rate
 - (iv) CMRR
 - (v) Virtual Ground

3.

Attempt any two parts of the following

- (a) Minimize the following expressions using Boolean identities and Theorems.
 $AB + \overline{AC} + \overline{ABC}(AB + C)$
 $\overline{AB} + ABD + \overline{ABC}\overline{D} + BC$

(2x5)=10

- (b) Simplify the following expression using K Map.

$$f(A, B, C, D) = \prod m(0, 1, 3, 6, 7, 8, 9, 11, 13, 14, 15)$$

and draw the logic circuit for simplified expression

3.

- (c) The two input terminals of an op-AMP are connected to voltage signals of strength $745\mu V$ and $740\mu V$ respectively. The gain of the OP-AMP in differential mode is 5×10^5 and CMRR is 80dB. Calculate the output voltage and % error due to common mode.

4.

Attempt any two parts of the following

- (a) Compare ~~2~~ Analog and digital instrument. What are the advantages of digital instruments.

- (b) What is DVM? Draw the input circuit of DVM and output wave form of integrator used in DVM establish relation.

$$\text{out} \quad V_{in} = \frac{V}{R}t$$

where symbols have their usual meaning

- (c) Explain the function of CRT with diagram. Write in details about. Glass envelop and screen of CRT.

5.

Attempt any two parts of the following

(2x5)=10

- (a) Write the practical applications of CRO. Explain how phase and frequency can be measured with figures.

- (b) Draw the block diagram of CRO. How Lissajous patterns are obtained on the screen of CRO.
- How unknown frequency can be determined by using Lissajous pattern?

- (c) Draw the block diagram of DMM. Explain its working mention its applications.

- (c) Draw the structure of n-Channel JFET. Explain its operation with Drain and transfer characteristics. Explain the significance of Pinch off. (3)
- (d) Describe the working of P-channel E-MOSFET. Draw its Drain and Transfer curve. What is the significance of Threshold voltage. (3)

3.

Attempt any three parts from the following. From Unit- 3 Q.3 (a) is compulsory

- (i) Convert the following as indicated with procedures. (4)

$$\begin{array}{ll}
 \text{(a)} & (397.75)_{10} = (\quad)_{16} \\
 \text{(b)} & (23.AB)_{16} = (\quad)_{10} \\
 \text{(c)} & (101.01)_2 = (\quad)_{10} \\
 \text{(d)} & (62.7)_8 = (\quad)_{16}
 \end{array}$$

- (b) Using the K map method obtain the minimal sum of product expression of the following. (3)

$$F(A, B, C, D) = \sum m(0, 2, 3, 5, 7, 12, 15) + \sum d(1, 4, 8, 11)$$

and draw the logic circuit for simplified expression

- (c) Simplify the following logic expression using Boolean algebra. (3)

$$(i) f = AB + A(B + C) + B(B + C)$$

$$(ii) f = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}D + BCD + \bar{A}B + \bar{B}C$$

- (d) Explain the operation of OP-AMP as non inverting amplifier. Calculate its voltage gain. How it can be used as unity gain buffer draw the circuit and mention its uses. (3)

4.

Attempt any three parts from the following. From Unit- 4 Q.4 (a) is compulsory

- (a) Draw the schematic diagram of a CRO. Explain how phase and frequency can be measured by using CRO. (4)

- (b) What are digital instruments? Compare analog and digital instruments. Explain the operation of a basic digital multimeter with block diagram. (3)

- (c) Explain the basic principle of digital voltmeter. State the advantage of DVM over analog meter. Draw the block diagram of dual slope A/D converter type DVM (3)

- (d) Explain with diagrams how current and resistance can be measured with digital multimeter. (3)

Roll No.	26	1	6	0	4	1	0	5	9
----------	----	---	---	---	---	---	---	---	---

B.Tech.

Year 1st Semester 1st

Major Examination 2016-2017

FUNDAMENTALS OF ELECTRONICS ENGINEERING

Time: 3 Hours

M.M.: 40

Note: - Attempt all the questions. Each Question carries equal marks

1. Attempt any three parts from the following. From Unit- 1 Q.1(a) is compulsory

(a) A Voltage of $200 \cos \omega t$ is applied to HWR with load resistance of 5 Kohm. (4)
Find

- (i) Maximum dc current component
- (ii) rms current
- (iii) Ripple factor
- (iv) Rectifier efficiency

(b) How dynamic resistance of p-n diode can be determined graphically. Derive the (3) expression for the same.

For what voltage will the reverse saturation current in a p-n junction Ge diode reaches 90% of its saturation value at room temperature

(c) Draw the circuit of centre tapped full wave rectifier with Π filter. Derive the (3) expression for ripple factor and efficiency.

(d) Write short notes on any two of the following. (3)

- (i) Transition and diffusion capacitance of p-n junction
- (ii) Clipper circuits
- (iii) Voltage Doublers

2. Attempt any three parts from the following. From Unit- 2 Q.2 (a) is compulsory

(a) Why operating point is not selected near the saturation region? (4)

The CE germanium transistor amplifier circuit uses self bias with parameters $V_{cc} = 16V$, $R_C = 3K$ ohm, $R_E = 2K$ ohm, $R_I = 56$ Kohm, $R_2 = 20K$ ohm and $\alpha = 0.985$. Draw the circuit and calculate.

- (i) Co-ordinates of operating point
- (ii) Stability factor

(b) Draw the input and output characteristic curves of n-p-n transistor in CB configuration and indicate the different regions of operation. Establish the relation for collector current. (3)

- (c) Draw the structure of n-Channel JFET. Explain its operation with Drain and transfer characteristics. Explain the significance of Pinch off. (3)

- (d) Describe the working of P-channel E-MOSFET. Draw its Drain and Transfer curve. What is the significance of Threshold voltage. (3)

3.

Attempt any three parts from the following. From Unit- 3 Q.3 (a) is compulsory

- (a) Convert the following as indicated with procedures. (4)

$$(a) (397.75)_{10} = (\quad)_{16}$$

$$(b) (23.AB)_{16} = (\quad)_{10}$$

$$(c) (101.01)_2 = (\quad)_{10}$$

$$(d) (62.7)_8 = (\quad)_{16}$$

- (b) Using the K map method obtain the minimal sum of product expression of the following. (3)

$$F(A, B, C, D) = \sum m(0, 2, 3, 5, 7, 12, 15) + \sum d(1, 4, 8, 11)$$

and draw the logic circuit for simplified expression

3.

- (c) Simplify the following logic expression using Boolean algebra. (3)

$$(i) f = AB + A(B+C) + B(B+C)$$

$$(ii) f = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}D + B\bar{C}\bar{D} + \bar{A}B + B\bar{C}$$

- (d) Explain the operation of OP-AMP as non inverting amplifier. Calculate its voltage gain. How it can be used as unity gain buffer draw the circuit and mention its uses. (3)

4. **Attempt any three parts from the following. From Unit- 4 Q.4 (a) is compulsory**

- (a) Draw the schematic diagram of a CRO. Explain how phase and frequency can be measured by using CRO. (4)

- (b) What are digital instruments? Compare analog and digital instruments. Explain the operation of a basic digital multimeter with block diagram. (3)

- (c) Explain the basic principle of digital voltmeter. State the advantage of DVM over analog meter. Draw the block diagram of dual slope A/D converter type DVM. (3)

- (d) Explain with diagrams how current and resistance can be measured with digital multimeter. (3)

Time: 3 Hrs.

Note: Attempt all questions. Each question carries equal marks.

Max. Marks: 50

1. Attempt any five parts of the following:

- (a) Differentiate the following:
 i) interpreter and compiler ii) low level language and high level language

- (b) Write a program in C to print the alternate elements of the Fibonacci series upto 20 terms.

- (c) Write a program in C to print the sum of following series up to 10 terms. You may take any value of x.

$$1 - x^2/12 + x^4/14 - \dots$$

- (d) Find the output of following programs, discuss the reasons and show your calculations in your answer sheet.

i) Inputs entered by user are: 26715 98 ii) void main()

```
void main()
{
    int p, q;
    scanf ("%2d%5d", &p, &q);
    printf ("%d%d", p, q);
    printf ("%7.2f", 78.6122);
```

```
{
    if(2<1);
    else
        x = (2<0) ? printf("one") : printf("four");
    printf ("%d", x);
}
```

- (e) Write a program in C to print the all BUZZ numbers between 1 to 100. A number is said to be BUZZ number if it ends with 7 or is divisible by 7.

- (f) Write a program in C to print the following pattern:

9

8

7

6

5

4

3

2

1

0

- (g) Write short notes on the following:

- i) microcontroller ii) micro computer iii) mini computer iv) microprocessor

2. Attempt any two parts of the following: (2×5 = 10)

- (a) Write a program in C to accept 50 numbers and print the second smallest and third largest numbers among them.

- (b) Write a program in C to store two sorted arrays in the third array in descending order.

- (c) Write a program in C to sort a set of names stored in an array in alphabetical order.

3.

Attempt any two parts of the following:

- (a) Write a program in C which accept the radius and height in main function and pass them to functions. Functions calculate the area, volume and perimeter of a cone and their values get printed in main function. $(2 \times 5 = 10)$
- (b) Write a program in C to find the GCD of two numbers using recursion function. Also, find the output of following programs, discuss the reasons and show your calculations in your answer sheet.

i) int i;
void increment()
{
 i = i + 1;
 printf("%d", i);
}
void main()
{
 printf("%d", i);
 increment();
 increment();
}

ii) void foo(int *p)
{
 int j = 2;
 p = &j;
 printf("%d", *p);
}
int main()
{
 int i = 97, *p = &i;
 foo(&i);
 printf("%d", *p);
}

- (c) Write a program in C to print the prime position elements of an array. For example: 16 20 3 76 25 23 123
12 303 1 45 0 67..... are array elements. You have to print 20 3 25 123 45 67.....
Also, find the output of following programs, discuss the reasons and show your calculations in your answer sheet.

i) int x = 10;
void main()
{
 extern int y;
 printf("%d %d", x, y);
}
int y = 20;

ii) int x = 30;
void display()
{
 int x = 15;
 printf("%d", x);
}
void main()
{
 display();
 printf("%d", ...);
}

4. **Attempt any two parts of the following:** $(2 \times 5 = 10)$

- (a) Write a C program to split an array from particular position and add first part to the end. Also, write the short notes on the following:

i) file handling

ii) static memory allocation

iii) dynamic memory allocation

- (b) Write a C program to swap three numbers in cyclic order using call by reference. For example, if $a = 1, b = 2, c = 3$; after swap: $a = 3, b = 1, c = 2$. Also, write a program in C to fill the array and print the odd position elements of an array using pointer.

- (c) Write a program in C to create a union that contains the following details about book: Author name, Book page, Book price. Consider there are 100 books. Print the details of all books using function and access the union elements using pointer.

5. **Attempt any two parts of the following:** $(2 \times 5 = 10)$

- (a) Consider there are 100 students. Details corresponding to each student are Roll number, Name, Branch, Year of joining. Write a program in C to construct the structure that contains the above details and print the details of all students who have same year of joining by passing 'structure elements' to the function and 'structure variable' to the function.

- (b) Write a program in C to print all permutations of a given string using pointer.

- (c) Write a program in C that takes two sets as input and print cartesian product of two sets.

e.g. Input: $A = \{1, 2\}, B = \{3, 4\}$

Output: $A \times B = \{\{1, 3\}, \{1, 4\}, \{2, 3\}, \{2, 4\}\}$

B. Tech.
 ODD SEMESTER
 MAJOR EXAMINATION 2017 - 2018
 Applied Engineering Chemistry

Time: 3 Hrs.

Note: Attempt all questions. Each question carry equal marks.

Max. Marks: 50

1.

Attempt any four parts of the following:

 $(4 \times 2.5 = 10)$

- (a) Define the terms internal energy and enthalpy and give the relationship between them.
- (b) State the second law of thermodynamics in terms of entropy and express it mathematically. What is the change in entropy in a thermodynamically reversible process?
- (c) Compute the enthalpy of formation of nitric oxide using the following data:
 $\text{NO} + \text{CO} \rightarrow \frac{1}{2} \text{N}_2(\text{g}) + \text{CO}_2(\text{g}) ; \Delta H = -372.2 \text{ kJ/mol}$
 Where $\Delta H_f^\circ(\text{CO}) = -110.5 \text{ kJ/mol}$ and $\Delta H_f^\circ(\text{CO}_2) = -393.5 \text{ kJ/mol}$
- (d) A first order reaction is 50% completed in 30 minutes. Calculate the time required for 75% completion of the reaction.
- (e) Explain the hydrolysis of salts in water. What is hydrolysis constant?
- (f) The rate of a reaction becomes three times when the temperature is changed from 298K to 358K. Calculate the energy of activation for the reaction. Given $R = 8.314 \text{ J/K/mol}$.

2.

Attempt any two parts of the following:

 $(2 \times 5 = 10)$

- (a) Suggest a suitable mechanism for the reaction:
 $\text{CH}_3\text{CHDBr} + \text{OH}^- \rightarrow \text{CH}_3\text{CHDOH} + \text{Br}^-$. Explain the stereochemistry and order of the reaction.
- (b) Give the mechanism of bromination of benzene explaining the requirement of catalyst for the reaction. Also explain the directing effect of bromine in the product formed.
- (c) What are rearrangement reactions? Explain the mechanism of Beckmann rearrangement with the help of a suitable example.

3.

Attempt any two parts of the following:

 $(2 \times 5 = 10)$

- (a) Identify the type (of reaction) and explain the mechanism for the reaction:
 $(\text{CH}_3)_3\text{C}-\text{Br} + \text{KOH} \rightarrow (\text{CH}_3)_3\text{C}=\text{CH}_2 + \text{KBr} + \text{H}_2\text{O}$
- (b) Write an explanatory note on Friedel-Crafts alkylation of aromatic ring giving the reaction conditions, role of the catalyst and mechanism of the reaction.
- (c) What are addition reactions? Give examples of three different types of addition-reactions. Give the mechanism of hydration of alkenes.

4.

Attempt any two parts of the following:

(2 × 5 = 10)

- (a) Discuss the concept of primary and secondary valencies (with suitable examples) in coordination complexes as postulated in Werner's theory
- (b) Explain the term "crystal field splitting" and show splitting of d-orbital in tetrahedral complexes.
- (c) Write the IUPAC names of the following complexes:
(i) $[\text{Co}(\text{en})_3]\text{Cl}_3$ (ii) $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$ (iii) $[\text{CoSO}_4(\text{NH}_3)_4]\text{NO}_3$
(iv) $[\text{Cd}(\text{SCN})_4]\text{SO}_4$ (v) $[\text{Pt}(\text{NH}_3)_4]\text{[PtCl}_4]$

5.

Attempt any two parts of the following:

(2 × 5 = 10)

- (a) What are low spin and high spin complexes? The complex $[\text{Co}(\text{NH}_3)_6]^{3+}$ is diamagnetic but $[\text{CoF}_6]^{2-}$ is paramagnetic. Explain using crystal field theory.
- (b) Write an explanatory note on the structural isomerism in inorganic complexes. Give the structures of all the isomers of $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$.
- (c) How does the formation of a coordination complex take place according to valence bond theory? What are the limitations of the theory?

B. Tech. I Semester
ODD SEMESTER
MAJOR EXAMINATION 2017 - 2018

Subject Name: : Engineering Mathematics-I

Time: 3 Hrs.

Note: Attempt all questions. Each question carry equal marks.

Max. Marks: 50

1. Attempt any four parts of the following:

(4 × 2.5 = 10)

(a) If $y = x \log \frac{x-1}{x+1}$, show that $y_n = (-1)^{n-2} (n-2)! \left[\frac{x-n}{(x-1)n} - \frac{x+n}{(x+1)n} \right]$.

(b) If $\frac{x^2}{a^2+u} + \frac{y^2}{b^2+u} + \frac{z^2}{c^2+u} = 1$, prove that $\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 + \left(\frac{\partial u}{\partial z}\right)^2 = 2 \left(x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} \right)$.

(c) If u is the homogeneous function of degree n then show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = nu$. Using this find the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ if $u = \frac{1}{x^2} + \frac{1}{xy} + \frac{\log x - \log y}{x^2+y^2}$.

(d) Find the rank of the matrix A by applying elementary transformation

$$A = \begin{bmatrix} 0 & 2 & 1 & 3 \\ 1 & 1 & -1 & -2 \\ 1 & 2 & 0 & 1 \\ -1 & 1 & 2 & 6 \end{bmatrix}.$$

(e) Find the values of k for which the following system of equations has non-trivial solutions.
Solve equations for such values of k

$$(k-1)x + (3k+1)y + 2kz = 0, \quad (k-1)x + (4k-2)y + (k+3)z = 0, \\ 2x + (3k+1)y + 3(k-1)z = 0.$$

(f) If $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$, use Cayley-Hamilton theorem to find A^{-1} and $B = A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$.

Attempt any two parts of the following:

(2 × 5 = 10)

(a) (i) Evaluate $\int_0^\infty \int_0^x xe^{-x^2} / y dx dy$ by changing the order of integration.
(ii) Evaluate $\iint xy dx dy$ over the positive quadrant of $x^2 + y^2 = a^2$.

(b) Find the volume and mass contained in the solid region of the positive octant of the surface $\left(\frac{x}{a}\right)^p + \left(\frac{y}{b}\right)^q + \left(\frac{z}{c}\right)^r = 1$, where $p, q & r > 0$, given that density at any point $\rho(x, y, z) = k\sqrt{xyz}$.

(c) Evaluate (i) $\int_0^2 x(8-x^3)^{1/3} dx$ (ii) $\int_{-\infty}^{\infty} \cos \frac{\pi}{2} x^2 dx$.

3.

Attempt any two parts of the following:

(2 × 5 = 10)

(a) (i) Find the area enclosed between the parabolas $y^2 = 4a(a-x)$ and $y^2 = 4a(x+a)$.
(ii) Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} dx dy dz$.

(b) Let D be the region in the first quadrant bounded by $x=0, y=0$ and $x+y=1$. Change the variables x, y to u, v , where $x+y=u, y=uv$ and evaluate $\iint_D xy(1-x-y)^{1/2} dx dy$.

(c) Prove that $\beta(p, q) = \int_0^1 \frac{x^{p-1+q}}{(1+x)^{p+q}} dx = \beta(p+1, q) + \beta(p, q+1)$.

Attempt any two parts of the following:

4. (a) (i) Show that $\operatorname{div}(\operatorname{curl} \vec{V}) = 0$, for any vector point function \vec{V} . (2 \times 5 = 10)

(ii) Show that $\operatorname{div}(\operatorname{grad} f(r)) = \frac{d^2}{dr^2} f(r) + \frac{2}{r} \frac{df}{dr} f(r)$, where $r = \sqrt{x^2 + y^2 + z^2}$.

(b) Verify Stokes theorem for the field for the vector field $\vec{F} = (2x-y)\hat{i} - yz^2\hat{j} - y^2z\hat{k}$ over the upper half surface of $x^2 + y^2 + z^2 = 1$, bounded by its projection on the $x - y$ plane.

(c) Find the constant a, b and c so that vector function $\vec{A} = (x+10y+8az)\hat{i} + (bx-3y-5z)\hat{j} + (4x+cy+2z)\hat{k}$ is irrotational. Then show that \vec{A} can be expressed as the gradient of a scalar function ϕ and hence find ϕ .

Attempt any two parts of the following:

5. (a) (i) Find the direction in which the directional derivative of $\phi(x, y) = \frac{x^2+xy^2}{xy}$ at $(1, 1)$ is zero. (2 \times 5 = 10)

(ii) Find the constant a and b such that the surface $3x^2 - 2y^2 - 3z^2 + 8 = 0$ is orthogonal to $ax^2 + 9y^2 = bz$ at $P = (-1, 2, 1)$.

(b) Verify Gauss's divergence theorem for $\vec{F} = (x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$ taken over the rectangular parallelepiped $0 \leq x \leq a$, $0 \leq y \leq b$ and $0 \leq z \leq c$.

(c) Apply Green's theorem to evaluate $\int_C (y - \sin x) dx + \cos x dy$ where C is the plane triangle enclosed lines $y = 0$, $x = \frac{\pi}{2}$ and $y = \frac{2x}{\pi}$.

Roll No. _____
 B.Tech.
 EVEN SEMESTER
 Major Examination 2017-2018

Time: 3 hrs.
 Note: Attempt all questions. All questions carry equal marks.

Subject Name: Engineering Chemistry

Q. 1 Attempt any five of the following. Max. Marks: 50

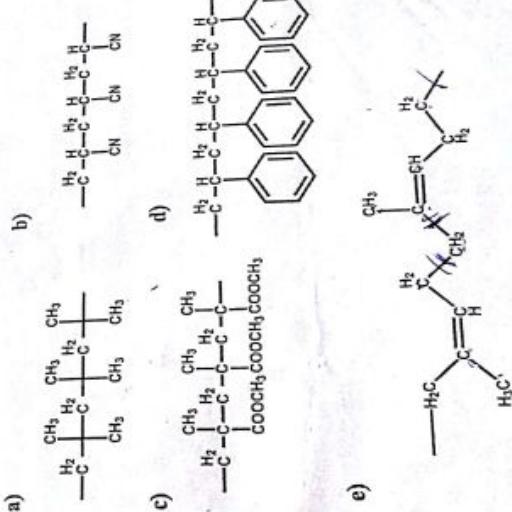
- (a) Account for paramagnetic behaviour of oxygen on the basis of molecular orbital theory.
 (b) What is meant by inter-molecular and intra-molecular H-bonding?
 (c) Calculate the number of atoms per unit cell in simple cubic (BCC) and face centred cubic (FCC).
 (d) Calculate the angle at which first order reflection and second order reflection will occur in X-ray spectrometer when X-rays of wavelength 1.54 Å, are diffracted by the atom of a crystal, given that the interplaner distance is 4.04 Å.
 (e) In the phase diagram of water system, explain i) a bivariant system, ii) an univariant system.
 (f) Draw the potential energy diagram for the various conformations of n-butane.
 (g) Write short note on Aldol condensation.

Q. 2 Attempt any two of the following.
 (a) Differentiate between thermoplastics and thermosets.
 (b) Write the difference between addition polymer and condensation polymer with example.

216g of 1, 3-butadiene is copolymerized with 104g of styrene. Determine the molecular formula of the copolymer?

- (c) Write short note on the following.
 a) PMMA
 b) Arylic polymer
 c) Isotactic polymer
 d) Vulcanization of natural rubber

(d) Identify the repeating unit in the following structure and state the name of the monomer.



Q. 3 Attempt any two of the following.

(a) Write notes on.

i) Free radical polymerization ii) Nylon-6 iii) Nylon-6, 10

5

(b) What is meant by calorific value of a fuel? What is difference between gross calorific value and net calorific values?

In an experiment in a bomb calorimeter, a solid fuel of 0.90g is burnt. It is observed that increase of temperature is 10°C of 5000g of water. The fuel contains 10% of H.

Calculate the gross calorific value and net calorific value (Equivalent weight of water = 100g, Latent heat of steam = 587 cal/g).

(c) Give the structure of the following polymers.

a) SBR b) NBR c) Orton d) Nylon-6, 6

e) Polyurethane

5

Q. 4 Attempt any two of the following.

(a) Write the Lambert-Beer law of UV-vis spectroscopy. The solution of compound having concentration 0.0001 g/l gave 0.2 absorbance value when measuring using 1.0cm cell. Calculate molar extinction coefficient.

(b) Define the terms chromophore, bathochromic shift, auxochrome, and hypsochromic shift in UV spectroscopy. Write the application of UV spectroscopy.

(c) What do you understand by hard and soft water? What are the permanent and temporary hardness? Write the constituents responsible for hardness in water. Explain the lime-soda process used for removing hardness in water.

Q. 5 Attempt any two of the following.

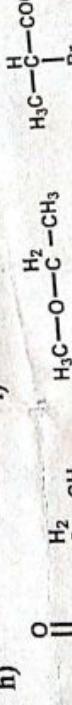
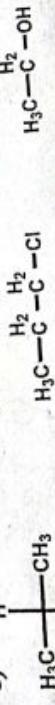
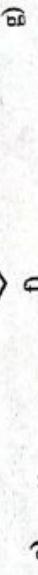
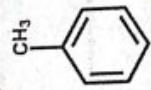
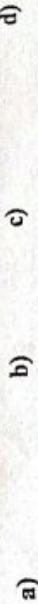
(a) Describe the zeolite process for water softening. Explain the advantages and disadvantages of the zeolite and lime-soda processes for water softening.

(b) Write the application IR spectroscopy. Describe the various molecular vibrations in the technique.

(c) Find the number of fundamental vibrations for the following molecules as under.

Monoatomic (Ne), Diatomic (HCl), triatomic linear molecule (CO_2) and triatomic non-linear (H_2O) molecules.

(d) Define chemical shift. Show the expected NMR signals and their splitting in the following compounds.



Roll No. 2017051064

B.Tech
(SEM D) ODD SEMESTER
MAJOR EXAMINATION 2017-2018
Industrial Psychology

Time: 3 Hrs.

Note: Attempt all questions. Each question carry equal marks.

Max. Marks: 50

1. Attempt any four parts of the following:

- (a) What were the fundamental principles of Taylor's theory? Describe how Taylor reorganized labor force at Bethlehem Steel using these principles.
(b) What were the major insights/principles of Human Relations School?
(c) Explain the Hierarchy of Needs and Hygiene Motivation theories.
(d) Explain the properties of a group. Also explain, why do people form groups?
(e) What is organizational culture? How to create and sustain organizational cultures?
(f) Explain the Trait theory and Behavioral theories of leadership.

2. Attempt any two parts of the following: (2 x 5= 10)

- (a) What are the industrial factors that cause fatigue and the methods to reduce it?
(b) Why do industrial workers need healthy work environment? What are the factors that influence work environment?
(c) Explain psychological testing, its advantages, and disadvantages. Also, list some major psychological tests.

3. Attempt any two parts of the following: (2 x 5= 10)

- (a) Define recruitment and explain the purpose of conducting it? Explain how recruitment is conducted.
(b) Define industrial accidents and describe costs associated with it. Also, describe at least five factors that cause industrial accidents.
(c) Define job analysis and explain the purpose/importance of conducting it.

4. Attempt any two parts of the following: (2 x 5= 10)

- (a) Critically examine the comparative methods of performance appraisal.
(b) Define performance appraisal and explain its purpose. Typically, who conducts performance appraisal and what is the latest development in this area?
(c) Elaborate your understanding of the absolute methods of performance appraisal.

(2 x 5= 10)

5. Attempt any two parts of the following: (2 x 5= 10)

- (a) Explain what is training and what is development? Do they differ? How?
(b) Explain the process of training and various methods of conducting it.
(c) Explain how would you design an effective training programme?

Time: 2 Hrs.

Applied Engineering Chemistry

Note: Answer all questions.

Max. Marks: 20

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

- (a). Using first law of thermodynamics derive the expression: $C_p - C_v = R$
- (b). Calculate the maximum work (in Joules) for the expansion of 1 mole of an ideal gas from a volume of 10 liters to 20 liters (exactly) at 25°C.
- (c). Define and explain the "activation energy" for a chemical reaction. How the activation energy is related to the rate constant of a chemical reaction? Explain.
- (d). Explain the electrochemical theory of corrosion in brief.

Q.2 Attempt any Two parts of the following. Q. 2(a) is compulsory.

- (a). Explain the term "entropy". Derive the expression for maximum efficiency of an thermos-mechanical engine operating between two temperatures T_1 and T_2 using Carnot cycle.
- (b). State the first law of thermodynamics and explain the terms internal energy, heat and work.
- (c). Explain the Arrhenius theory of electrolytic dissociation.

Q.3 Attempt any Two parts of the following. Q. 3(a) is compulsory.

- (a). Derive the expression for the rate constant of second order reaction where the concentrations of both the reactants are different. Also show that when one of the reactants is present in large excess, the second order reaction behaves like a first order reaction.
- (b). Define standard electrode potential. Explain oxidation and reduction half-cell reactions occurring in a Daniel cell.
- (c). Write a short note on corrosion inhibitors.

Time: 2 Hrs.
 Note: Answer all questions.

f

Applied Engineering Chemistry

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

- (a). Using first law of thermodynamics derive the expression $C_p - C_v = R$
- (b). Calculate the maximum work (in Joules) for the expansion from a volume of 10 liters to 20 liters (exactly) at 25°C.
- (c). Define and explain the "activation energy" for a chemical reaction. How the activation energy is related to the rate constant of a chemical reaction? Explain.
- (d). Explain the electrochemical theory of corrosion in brief.

Max. Marks: 20

Q.2 Attempt any Two parts of the following. Q. 2(a) is compulsory.

- (a). Explain the term "entropy". Derive the expression for maximum efficiency of anthermos-mechanical engine operating between two temperatures T_1 and T_2 using Carnot cycle.
- (b). State the first law of thermodynamics and explain the terms: internal energy, heat and work.
- (c). Explain the Arrhenius theory of electrolytic dissociation.

2

Q.3 Attempt any Two parts of the following. Q. 3(a) is compulsory.

- (a). Derive the expression for the rate constant of second order reaction where the concentrations of both the reactants are different. Also show that when one of the reactants is present in large excess, the second order reaction behaves like a first order reaction.
- (b). Define standard electrode potential. Explain oxidation and reduction half-cell reactions occurring in a Daniel cell.
- (c). Write a short note on corrosion inhibitors.

2

Note: Attempt all questions. Each question carries equal marks.

Q. 1 Attempt any five parts of the following:

- (a) Solve, $(D^2 + 3D + 2)y = xe^x \sin x$.
- (b) Solve, by the variation of parameters $(D^2 - 1)y = e^{-2x} \sin e^{-x}$.
- (c) Solve, $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 4y = 4x^3 - 6x^3$, $y(2) = 4, y'(2) = -1$.

$$(d) \text{ Solve, } \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + (x^2 + 2)y = e^{\frac{1}{2}(x^2+2x)}$$

$$(e) \text{ Show that } \int_1^1 (x^2 - 1)P_{n+1}P_n' dx = \frac{2n(n+1)}{(2n+1)(2n+3)}$$

$$(f) \text{ Show that } \int J_3(x) dx = -J_2 - \frac{2}{x} J_1$$

(g) Solve, $xy' - 3y = k$ where k is a constant using power series method.

2*5=10

Q. 2 Attempt any two parts of the following:

(a) Find the Laplace transform of

$$f(t) = \begin{cases} t, & 0 < t < a \\ 2a - t, & a < t < 2a \end{cases} \text{ where } f(t+2a) = f(t)$$

(b) i. Find the Laplace transform of $\frac{\sin at}{t}$. Does the Laplace transform of $\sin at$ exist?

ii. Find the Laplace transform of the following function by representing it in terms of unit step function

$$f(t) = \begin{cases} t-1, & 1 < t < 2 \\ 3-t, & 2 < t < 3 \end{cases}$$

iii. Evaluate the following integral using Laplace transform

$$\textcircled{C} \int_0^{\infty} \frac{e^{-ct} \sin^2 t}{t^2} dt, \int_0^{\infty} e^{-2t} t \sin 3t dt$$

(c) Find the inverse Laplace transform of

$$\text{i. } \frac{As+B}{Cs^2+Ds+E} \\ \text{ii. } \frac{e^{-s}}{s^4+4a^4}$$

Q. 3 Attempt any two parts of the following.

(a) Solve the following differential equation using Laplace transform
 $x'' + 9x = \cos 2t$, if $x' = \frac{dx}{dt}$, $x(0) = 1$ and $x\left(\frac{\pi}{2}\right) = -1$. 2*5

(b) Solve, $t \frac{d^2x}{dt^2} + \frac{dx}{dt} + tx = 0$, $x(0) = 1$, $x'(0) = 0$ using Laplace transform. 2*5

(c) (i) Solve the following simultaneous differential equations using Laplace transform

$$\frac{dx}{dt} - y = e^t, \frac{dy}{dt} + x = \sin t, \text{ given } x(0) = 0 = y(0).$$

(ii) Solve the integral equation

$$y'(t) = t + \int_0^t y(t-u) \cos u du, y(0) = 4.$$

Q. 4 Attempt any two parts of the following.

(a) Find the Fourier series of the function $f(x) = x^2$. 2*5=10

Hence find the value of

$$\int_{-\pi}^{\pi} x^2 dx$$

i. $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2}$,

ii. $\sum_{n=1}^{\infty} \frac{1}{n^2}$ and

iii. $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}$.

(b) Obtain the Fourier series for

$$f(x) = \begin{cases} x, & -1 < x \leq 0 \\ x+2, & 0 < x < 1 \end{cases}$$

Hence, deduce the sum of $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} \dots \dots \dots$

(c) (i). Solve: $(D^2 + DD' - 6D)y = x^2 \sin(x+y)$.

(ii). Find a real function V of x and y , reducing to zero when $y = 0$ and satisfying $\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} + 4\pi(x^2 + y^2) = 0$.

Q. 5 Attempt any two parts of the following.

2*5=10

(a) (i) Solve, $(D^2 + 4DD' - 5D')z = 2\cos y - x \sin y$.

(ii) Solve, $(D^2 - 2DD' + D')z = x^2 y^2 e^{x+2y}$.

(b) (i) Solve: $(r + 2s + t + 2p + 2q + 1)z = \cos mx \cos nx + \sqrt{x+y}$.

(ii) Solve, $(D^2 - D'^2)z = e^{x-y} \sin(2x+3y)$.

(c) Find the half range sine series for $f(x) = x(\pi - x)$ in the interval $(0, \pi)$ and deduce $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} + \dots = \frac{\pi}{32}$.

Roll No. 2 0 1 7 0 5 1 0 6 4

B. Tech. Iyr

MAJOR EXAMINATION 2017 - 2018
EVEN SEMESTER
Professional Communication

Time: 3 Hrs.

Note: Attempt all questions. Each question carries equal marks.

1. Attempt any five parts of the following:

- (a) What is communication? Describe the functions of communication. $(5 \times 2 = 10)$
- (b) A good writer is not necessarily a good speaker. Explain
- (c) What are seven Cs? Discuss at least two of them.
- (d) What is inductive order of writing a paragraph? How is it different from deductive order? Explain with examples
- (e) What is listening comprehension? Suggest tips to enhance listening skill.
- (f) Do as directed in the brackets:

- (i) When not yet five, his father began daily batting practice with his son in his courtyard.(Rewrite after removing awkward construction)
- (ii) My bag containing a mobile phone, two books and three pens were lost yesterday.(Rewrite after making corrections, if any)
- (iii) Strikes are started by a few students which are not interested in his work.(Correct the sentence)
- (iv) I aimed my gun at the tiger.(Change the sentence into passive voice)

- (g) Give some tips to improve and enhance reading skill.

2. Attempt any two parts of the following: $(2 \times 5 = 10)$

- (a) What is difference between a thesis and a research paper? Throw light on the essential features of good research paper.
- (b) Prepare on project report on "The future of Animation in Indian Film Industry".
- (c) What is difference between solicited and unsolicited proposal? Write a technical proposal to the head of your organization for renovation of mess in your hostel.
Invent the necessary details.

3. Attempt any two parts of the following:**(2× 5 = 10)**

(a) How personal letters are different from business letters? What elements constitute a letter? Describe

(b) You wish to purchase a laptop for your personal work. Write a letter of enquiry to the supplier of laptop asking for prices and other terms and conditions for its safe delivery. Invent the required details.

(c) You have seen an advertisement in a leading newspaper asking young graduates to apply for assistant manager in a reputed multinational company. Mail your C.V. and invent the necessary details.

4. Attempt any two parts of the following:**(2× 5 = 10)**

(a) What is a good speech? Explain its features.

(b) Audience analysis and locales are very important from a presenter's point of view during

(c) What major points should a person bear in mind while appearing for interview? Discuss speech delivery. Explain

5. Attempt any two parts of the following: (2x5=10)**(2× 5 = 10)**

(a) What is audio-visual aids? List the essential visual aids for effective presentation.

(b) What do you understand by time management? Discuss its role in effective presentation.

(c) What is body language? Write a note on its advantages and limitations during oral presentation.

B. Tech.

(SEM II) ODD SEMESTER

MAJOR EXAMINATION 2017-18

Engineering Physics II

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carries equal marks.**Q.1 Attempt any five parts of the following.**

(5 x 2 = 10)

- (a) Define the following terms in crystal structure
 (i) Space lattice, (ii) Basis (iii) Primitive cell (iv) Unit cell
- (b) Obtain the Miller indices of a plane which intercepts at a , $b/2$, $3c$ in a simple cubic unit cell. Draw a neat diagram showing the plane.
- (c) Explain packing factor in cubic lattices? Describe the ways in which crystal may have closest packing of atoms.
- (d) Discuss Laue's principle of X-ray diffraction and obtain the diffraction condition for a simple cubic lattice.
- (e) Find the reverberation time of an office which has volume of 3000 m^3 and a total sound absorption of 75 metric sabine. Estimate the additional sound absorption required for an optimum reverberation.
- (f) What steps would you take to improve the acoustics of hall? Explain with reason.
- (g) What is Non-Destructive Testing (NDT)? What are the factors affecting the choice of NDT method.

Q.2 Attempt any two parts of the following:

(2 x 5 = 10)

- a) State Ampere's circuital law and discuss why and how it was modified to include the displacement current. Comment on the statement "The addition of displacement current resulted into unification of electrical and magnetic phenomena."

Subject Code: BEE-01
Time: 01 Hrs

Roll No. 2016011032

Minor Test (I) 2016 - 2017
Semester II (Even Semester)
Subject Name: PRINCIPLES OF ELECTRICAL ENGINEERING
Max. Marks: 10

Note: Attempt all the questions.

Q1. Explain the following with schematic diagram and characteristics.
 (a) Merits and demerits of Ohm's Law. (2)
 (b) Linearity & Nonlinearity.

Q2. (a) For the circuit shown in Fig. 1, find V_x using the mesh current method.

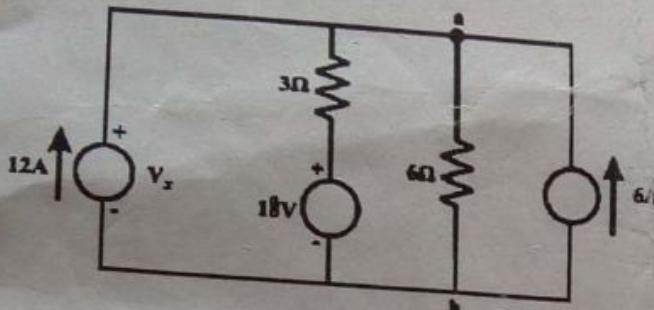


Figure 1

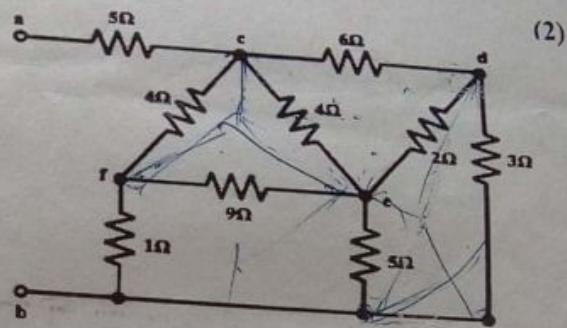
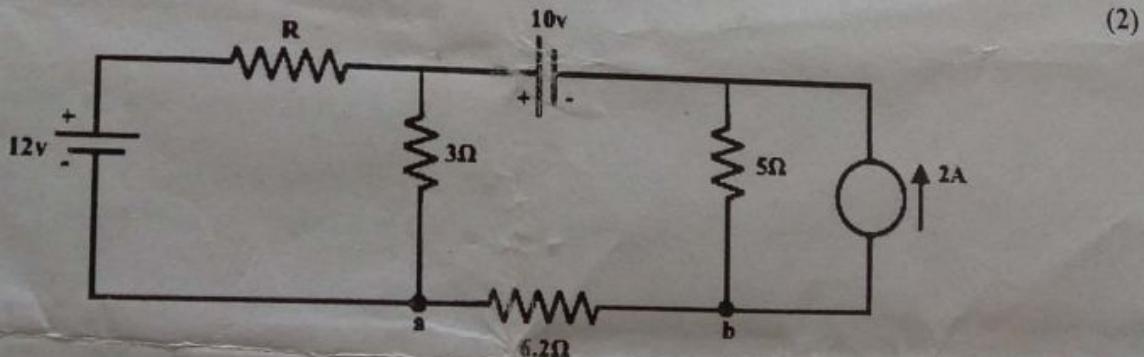


Figure 2

(b) Find the equivalent inductance R_{eq} of the network at the terminals 'a' & 'b' using star-delta transformations as shown in Fig. 2.

Q3. (a) Applying Norton's theorem, calculate the value of R that results in maximum power transfer to the 6.2 ohm resistor as shown in Figure below. Find the maximum power dissipated by the resistor 6.2 ohm under that situation. (2)



(b) State Thevenin's theorem and find out the current across 3 ohm resistance for Fig. 1 with Thevenin's theorem. (2)

Last Date of showing answer books of Minor Test - II is 27.02.2016

Roll No.											
----------	--	--	--	--	--	--	--	--	--	--	--

(Sem.II) EVEN Semester
Minor Test (II) 2015 - 2016

Subject Code BEE-01

Subject Name Principle of Electrical Engineering

MINOR TEST - II
Time: 01 Hrs

Q1: Determine the average value, r.m.s. value, form factor, peak factor of a half wave rectifier current signal.? Max. Marks: 10 [2]

Q2 (a): Explain three phase power measurement for a star connected load using pharos diagram & Circuit diagram. [2]

Q2 (b): Also derive an expression to calculate power factor $\cos\phi$ in Q2 (a). Also give a tabular representation of wattmeter readings at $\phi=0, 30, 60, 90$ degrees & observations during this. [2]

Q3 (a): Derive an expression of resonating frequency for the Figure 1 given below? [2]

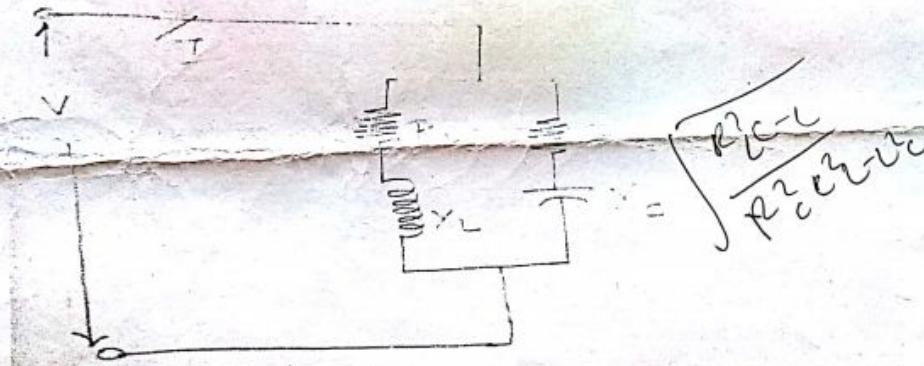


Fig. 1

Q3 (b): In the parallel circuit of Fig. 2, find-

- I if $I_R = 0.02 \angle 30^\circ$
- I_R if $I = 2 \angle -40^\circ$; also find the applied voltage.

[2]

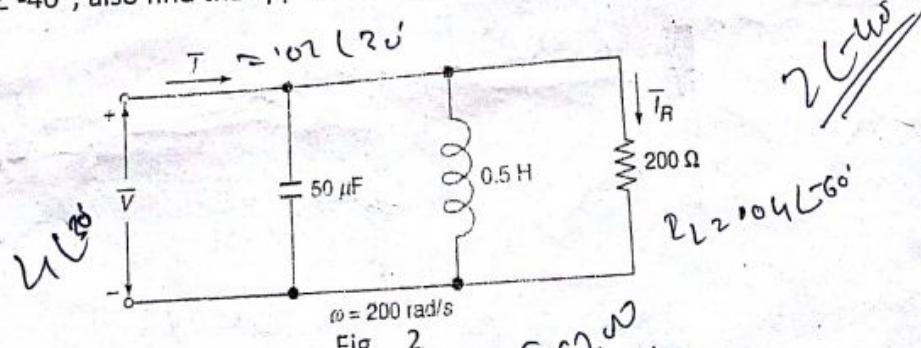


Fig. 2

~~100~~
~~300~~
~~200~~
~~100~~

~~50~~
~~100~~

D/R

Roll No.

2015011010

(Sem.II) EVEN Semester
Minor Test (I) 2015 - 2016

Subject Code BEE-01

MINOR TEST - I
Time: 01 Hrs

Subject Name Principle of Electrical Engineering

Max. Marks: 10

Q1: Derive the condition for maximum power transfer for a Thevenin's equivalent circuit? [2]

Q2 (a): Explain Thevenin's & Norton Theorem. [2]

Q2 (b): Determine the relation between v & i for the given circuit in Fig. 1. [2]

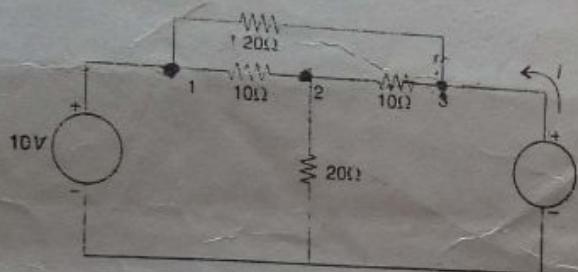
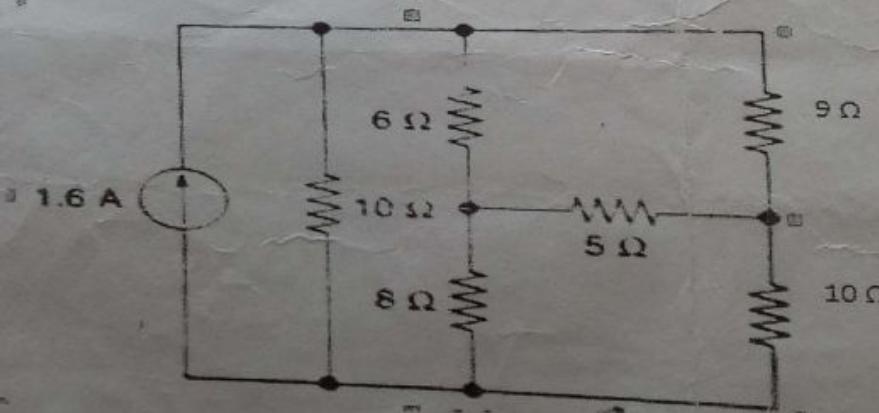


Fig. 1

$$\begin{aligned}
 10 &= 20i + 10 \\
 10 &= 10i + v \\
 10 &= 10i + 10 \\
 0 &= 10i - 10 \\
 0 &= 10(i - 1)
 \end{aligned}$$

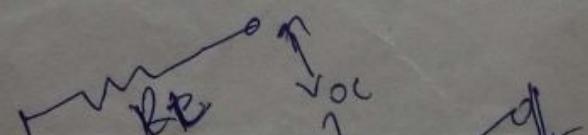
Q3 (a): Using mesh analysis, calculate the current in 5Ω resistor in Figure 2. [2]



0.244 A

Fig. 2

Q3 (b): What is source transformation. Prove it for practical voltage & current source by using proper mathematical relation & Graphs. ? [2]



Note: Answer all questions.

- | Q.1. Attempt any three parts of the following. Q.1 (a) is compulsory. | | Max. Marks-30 |
|--|----------------|---------------|
| a) What is communication? What are the parts of communication? Explain ~ | | 4 |
| b) Clarity and consistency are the most important features of communication. Describe ~ | | 3 |
| c) What is listening comprehension? What measures should be taken to enhance listening skill? Discuss | | 3 |
| d) A good writer is not necessarily a good speaker. Describe | | 3 |
| Q.2. Attempt any three parts of the following. Q.2 (a) is compulsory. | | |
| a) Listing the barriers of communication analyze the psychological and semantic barriers of communication. | | 4 |
| b) What is reading with understanding? Give tips for improving and increasing the reading skill with a good speed. | | 3 |
| c) What is technical communication? How does a technical writing differ from pure literature? Discuss ~ | | 3 |
| d) What are the advantages and disadvantages of oral communication? Describe | | 3 |
| Q.3. Attempt any three parts of the following. Q.3 (a) is compulsory. | | |
| (A) Answer the following: | | 3 |
| i. Write one-word substitution- | | 4 |
| (a) Which can be seen everywhere | | |
| (b) Study of sciences relating to the bodily structure of human. | | |
| ii. Give antonyms- | | |
| a) Climax | b) Include | |
| iii. Synonym of- | | |
| a) Freedom | b) Forgive | |
| iv. Give meaning of the following homophones: | | |
| a) Due, Dew | b) Cite, Sight | |
| (B) Fill in the blanks- | | |
| i. Suitable preposition- | | |
| a) He is proficientlanguage. (from/ in/of) | | |
| b) You should aim..... excellence.(by/with/at) | | |
| ii. Appropriate articles- | | |
| a) He was given ...reward for bravery. | | |
| b) Smith is going to....Sahara Desert. | | |
| iii. Proper conjunctions | | |
| a) Take care...else it could be too late. | | |
| b) He couldn't succeed.....he tried his best. | | |
| (C) What is Inductive order of writing a paragraph? Write a paragraph on the topic of your choice using | | |
| (D) Write a Précis of the following passage and give suitable title to it: | | |

There is an old saying that knowledge is power. Education is an instrument which imparts knowledge and therefore indirectly controls power. So since the dawn of civilization, persons in power have always tried to control or supervise education and its system. Therefore, it has been the handmaid of the ruling class. During the Christian era, the ecclesiastics controlled the institution of education and diffused the people the gospel of the Bible and religious teachings. These gospels and teachings were no other than a philosophy for the maintenance of the existing society. During the Renaissance, education passed from the clutches of the priests into the hands of the prince. Education, thus, combined is confined to the few elite.

Roll No. 2017051064

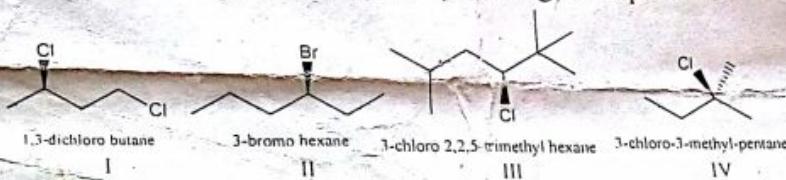
B. Tech.-I
 (SEM. I) Odd Semester (EE & ME)
 Minor Test 2017-2018
 Subject Name: Engineering Chemistry

Time: 02:00 Hrs.

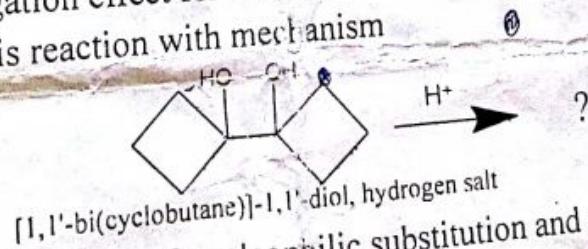
Max. Marks: 20

Note: Answer all questions.

1. Attempt any three parts of the following. Q. 1(a) is compulsory.
- Show how the LCAO approximation gives rise to bonding and antibonding orbitals. Illustrate your answer by reference to three different diatomic molecules. 4
 - Use energy level diagram and the band theory to explain the difference between conductors, insulators and semiconductors. 2
 - What is Cannizzaro and Cross Cannizzaro Reaction? Explain with suitable example and mechanism. 2
 - Find R- S configuration of the following examples. 2



2. Attempt any two parts of the following. Q. 2(a) is compulsory.
- Derive Bragg's equation for diffraction of X-rays by crystal. In Bragg's reflection of X-rays, a reflector was found at 30° with lattice plane of space, 1.87 Å. If this is a second order reflection. Calculate the wavelength of X-rays. 4
 - Draw the structure and write a note with application on fullerenes. 2
 - What is Liquid Crystal? Classify the different phases of Liquid Crystal. 2
3. Attempt any two parts of the following. Q. 3(a) is compulsory.
- What is Intermediate? Explain the inductive, mesomeric and Hyperconjugation effect for intermediate stability with suitable example. 4
 - Complete this reaction with mechanism. 2



- (c). Write the mechanism of nucleophilic substitution and elimination reaction with example. 2

1.

Attempt any four parts of the following:(a) Find the specific volume, enthalpy, internal energy and entropy of wet steam at 15 bar pressure and dryness fraction 0.8. $(4 \times 2.5 = 10)$

(b) What do you understand by boiler mountings and accessories? Also explain it in brief.

(c) What do you understand by Internal Combustion Engine? Explain Otto and Diesel Cycle with the help of P-V and T-s diagram.

(d) Explain the working of Cochran boiler with the help of neat sketch.

(e) Explain the working of Sine bar with the help of neat sketch.

(f) What do you understand by steel alloy? Also explain different types of steel alloy in brief.

Attempt any two parts of the following: $(2 \times 5 = 10)$

(a) Explain the terms: Yield point, Strain hardening and Ultimate strength. Draw the stress-strain diagram for mild steel and explain the salient features.

(b) A bar of steel is 60 mm x 60 mm in section and 180 mm long. It is subjected to a tensile load of 300 kN along the longitudinal axis and tensile loads of 750 kN and 600 kN on the lateral faces. If Young's modulus of steel is 200 GN/m^2 and Poisson's ratio is 0.3. Find the change in volume, modulus of rigidity and bulk modulus.

(c) Explain the term Resilience. Also Derive the expression for strain energy stored in a body when the load is applied gradually.

Attempt any two parts of the following: $(2 \times 5 = 10)$

(a) What do you mean by Hardness? Also Explain different types of hardness test.

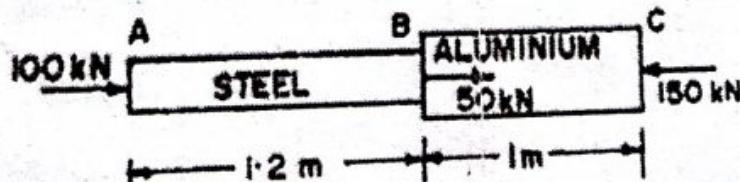
(b) A member ABC is formed by connecting a steel bar of 20 mm diameter to an aluminium bar of 30 mm diameter, and is subjected to forces as shown in Fig. 1. Determine the total deformation of the bar, taking E for aluminium as $0.7 \times 10^5 \text{ N/mm}^2$ and that for steel as $2 \times 10^5 \text{ N/mm}^2$. Also find the stress in aluminium bar.

Figure. 1

(c) Explain the following terms:

i) To

Attempt any two parts of the following:

(2 × 5 = 10)

- (a) Define the different types of loads which applied on beam. Also Explain different types of beam with the help of neat sketch.
- (b) Draw the shear-force and bending-moment diagrams for the simply supported beam as shown in figure.2.

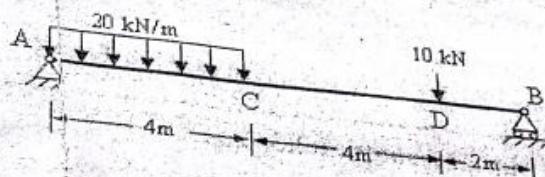


Figure.2

- (c) Draw the shear-force and bending-moment diagrams for the cantilever beam as shown in the figure.3.

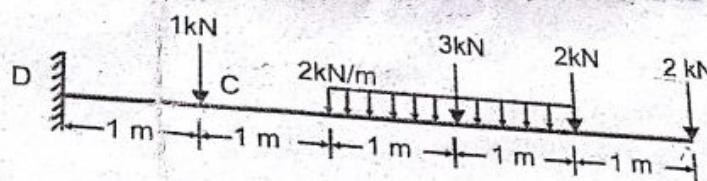


Figure.3

Attempt any two parts of the following:

(2 × 5 = 10)

What do you mean by Pure Bending? Also Derive the Bending equation for beam with assumptions.

- (b) Explain the term polar modulus. A solid circular shaft transmits 75 kW power at 200 rpm. Calculate the shaft diameter, if the twist is not to exceed 1° in 2 metres in length of shaft, and shear stress is limited to 50 MN/m^2 . Take modulus of rigidity = 100 GN/m^2 .
- (c) Three beams have the same length, the same allowable stress and the same bending moment. The cross-sections of the beams are a square, a rectangle with depth twice the width and a circle. Determine the ratios of weights of the circular and the rectangular beams with respect to the square beam.

Environment & Ecology

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. All questions carry equal marks.

Q.1 Attempt any five parts of the following. (5×2=10)

- Explain the scope and importance of environmental studies.
- Unawareness about the protection of environment will lead to detrimental consequences: comment with illustrations.
- Explain the roles of producers, consumers, and decomposers in an ecosystem.
- What are mineral resources? What are the harmful effects of extraction of minerals?
- Describe the structure, salient features, and function of a forest ecosystem.
- Discuss important world food problems? What are the characteristics of a healthy food?
- Explain the term "biodiversity". Give the reasons for the extinction of species.

Q.2 Attempt any two parts of the following. (2×5=10)

- What is water pollution? Discuss the effect of i) sewage and ii) agricultural discharges on water.
- What is soil pollution? What are its harmful effects? Discuss the methods of controlling soil pollution.
- Define air pollution. Suggest measures for controlling air pollution. Explain the working of any one device used for controlling air pollution.

(2×5=10)

Q.3 Attempt any two parts of the following.

- Define noise. Discuss various sources of noise. What are its effects? Describe the methods used for controlling noise pollution.

- (b). What are solid wastes and what are their different types? Name various methods of waste disposal and explain any one of them.
- (c). Write a short note on global warming explaining its reasons and consequences.

Q.4 Attempt any two parts of the following. (2×5=10)

- (a). What are NGOs? Write about the work done by any two Indian NGOs towards environmental protection.
- (b). The growth of human population took place at a very fast rate in 19th and 20th centuries – why? Are we successful in curtailing this growth rate now? Elaborate.
- (c). How environmental awareness can be inculcated in public? Discuss the role of an individual in prevention of pollution.

Q.5 Attempt any two parts of the following. (2×5=10)

- (a). Briefly discuss the salient features of Environment (Protection) Act, 1986.
- (b). Explain the term “population explosion”. What are its effects on environment and other human aspects?
- (c). Write the aims and objectives of “family welfare programs”. Discuss their implementation details.

Roll No. 2017051064

Minor/ Test Examination (B.Tech. I year)
Even Semester (2017-18)
Subject: Engineering Mathematics-II

Paper Code:

BAS 07

Time: 2:00 Hrs.

Total M:

Note: All questions are compulsory.

Q. 1. Attempt any three of the following questions. Q.1 (a) is compulsory.

a) Solve the following differential equations:

i. $\frac{d^2y}{dx^2} + y = \sec x \tan x$

ii. $y'' + 3y' + 2y = \sin(e^x)$.

b) Solve $y'' - 2y' + 2y = e^x \tan x$ by method of variation of parameter.

c) Solve: $x^2y'' + 3xy' + y = \frac{1}{(1-x)^2}$.

d) Solve :

$$\frac{d^2x}{dt^2} + 4x + y = te^t,$$

$$\frac{d^2y}{dt^2} + y = \sin^2 t.$$

Q. 2. Attempt any three of the following questions. Q.2 (a) is compulsory.

a) Solve: $(2x - 1)^2 y''' + (2x - 1)y' - 2y = x$.

b) Solve: $\sin^2 x y'' + \sin x \cos x y' + 4y = 0$.

c) Solve in series: $x(1-x)y'' + (3x-1)y' + y = 0$.

d) Solve in series: $(1-x^2)y'' + 2y = 0$.

Q. 3. Attempt any three of the following questions. Q.3 (a) is compulsory.

a) Define Bessel's differential equation of p^{th} order and hence find its series solution in terms of Bessel's function.

b) Show that:

i. $xJ'_n = nJ_n - xJ_{n+1}$

ii. $J_{-p}(x) = (-1)^p J_p(x)$ where p is positive integer.

c) Show that:

i. $\frac{d}{dx}(J_n^2 + J_{n+1}^2) = 2\left(\frac{n}{x}J_n^2 - \frac{n+1}{x}J_{n+1}^2\right)$.

ii. $J_2 = J_0'' - \frac{1}{x}J_0'$.

d) Show that:

i. $nP_n = xP'_n - P'_{n-1}$.

ii. $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} (x^2 - 1)^n$.

BAS-05

Roll No.

201705101

B. Tech.
EVEN SEMESTER
MINOR TEST 2017 - 2018

Environment & Ecology

Time: 2 Hrs.

Note: Answer all questions.

Max. 100

- Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.**
- (a). Explain why any study of environment becomes an interdisciplinary one. 4
 - (b). What are the sources of our food? Is there enough food in the world for all? 3
 - (c). What is the concept of food chain? Explain different types of food chains giving suitable examples. 3
 - (d) Distinguish among genetic biodiversity, species biodiversity and ecosystem biodiversity. 3

- Q.2 Attempt any Three parts of the following. Q. 2(a) is compulsory.**

- (a). Discuss the importance of forests. What are the economical aspects of forests? 4
- (b). How do the modern agricultural methodologies effect the environment? 3
- (c). Describe the merits, limitations and uses of solar energy. 3
- (d) Describe the advantages and disadvantages of constructing a dam. Do the benefits of constructing bigger dams outweigh their risks- discuss? 3

- 3 Attempt any Three parts of the following: Q. 3(a) is compulsory.**

- (a). Define "trophic level" and explain its sense. 4
- (b). Describe the structure, salient features, and functions of a pond ecosystem. 3
- (c). What is meant by biodiversity? What are various human actions responsible for the extinction of species? 3
- (d) Write an explanatory note on "conservation of biodiversity". Give two basic approaches for wildlife conservation. 3

BAS-12

Roll No.

2017061048

B. Tech.
EVEN SEMESTER
Minor Examination 2017-2018

Industrial Psychology

Time: 2 Hrs.

Max. Marks: 30

Note: Answer all questions

- Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.**
- (a) What do you understand by Industrial Psychology? Also describe the issues dealt by each of the sub divisions of Industrial Psychology. 4
 - (b) Explain how Industrial Psychology evolved and developed as a distinct discipline over the years. 3
 - (c) How would you define Organizational culture? What are the primary characteristics that capture the essence of an organization's culture? 3
 - (d) Explain at least three processes/ways in which groups affect individual behavior. 3

Q.2 Attempt any three parts of the following. Q. 2(a) is compulsory.

- (a) Discuss the essential elements of Scientific Management Theory as well as the reasons why it was criticized in the later years. 4
- (b) What were the major understandings about human behavior at workplace gained by the Hawthorne Research Group that led to the emergence of Human Relations School? 3
- (c) How would you conduct a Time Study? Explain its objectives, advantages, and disadvantages. 3
- (d) What are the features that make Industrial Psychology a distinct discipline from other similar disciplines? 3

Q.3 Attempt any Three parts of the following. Q. 3(a) is compulsory.

- (a) Provide a definition of Motivation and explain the major elements of this definition. Also, explain the three major ways in which studies and researches on Motivation have been summarized. 4
- (b) Explain the Trait and Behavioral theories of Leadership. 3
- (c) What is Job Satisfaction? Why an organization should make efforts to assess the Job Satisfaction level of its employees? 3
- (d) What are the various individual and organizational strategies to manage stress? 3

Roll No. 20175106

B.Tech. Even Semester (Sem.-II)
Minor Examination 2017-2018
Introduction to Computer Programming

Time: 2 hrs

Note: Attempt all questions. Each question carries equal marks.

Max. Marks: 20

Q.1 Attempt any three of the following; Q.1 (a) is compulsory.

(a) Write a program in C to calculate the percentage of marks of five subjects of a student and print whether he is fail or pass with division using nested if-else, where marks are user input. Also, write a program in C to check leap year given as input by user. 4

(b) How CPU is different from operating system? Describe the booting process. 2

(c) Discuss the following:

- i) Analog computer vs Digital computer
- ii) Low level language vs High level language
- iii) Microcomputer vs Minicomputer

(d) What will be output of the following programs? Discuss the reason and show your calculations. 2

i) void main()

```
{
    int x = -1, y = 0, z = 1;
    printf("%d", ++x && ++y || ++z);
    printf("%d%d%d", x, y, z);
}
```

ii) void main()

```
{
    int x = 10;
    printf("%d", --x + --x + x--);
    printf("%d", x);
}
```

Q.2 Attempt any two of the following; Q.2 (a) is compulsory.

(a) Write a program in C to read three numbers and print the largest among them using nested if-else. And also write a program in C to print the days of week using switch statement. 4

(b) Differentiate the following:

- i) microprocessor vs Microcontroller
- ii) Static RAM vs Dynamic RAM
- iii) Algorithm vs Program

(c) What is translator? Describe the program execution process. Show each step using diagram? 2

Q.3 Attempt any two of the following; Q.3 (a) is compulsory.

(a) Write a program in C to calculate the sum of following series: 4

187 184 181 178 175 172.....

Also find output of following programs and discuss the reason and show your calculations.

i) void main()

```
{
    int i=0;
    printf("%d", 1||i!=5&&i);
}
```

ii) void main()

```
{
    int a=-1, b=0, c=1, v;
    v=((10 && c != 8 || !c) ? (-a>b ? 3:4):(b ? 0:8));
    printf("%d", v);
}
```

(b) Draw the flow chart for the following pattern in terms of Fibonacci series 2

(c) Write a program to display the following pattern.

```

          A
        A B
      A B C
    A B C D
  A B C D E
A B C D E F
----- and so on -----

```

Time: 3 Hrs.

Note: Attempt all questions. Each question carry equal marks.

Max. Marks: 50

1. Attempt any four parts of the following: $(4 \times 2.5 = 10)$
- (a) Show that the massless particles can exist only if they move with speed of light and their energy E and momentum p must have the relation $E = pc$.
 - (b) Obtain the relativistic form of Newton's second law, when force (F) is parallel to v .
 - (c) Describe the postulates of Statistical Mechanics.
 - (d) How much does a proton gain in mass when accelerated to a kinetic energy of 500 MeV?
 - (e) Find the speed of 0.1 MeV electrons according to the classical and relativistic mechanics.
 - (f) Using the postulates of special theory of relativity derive the Lorentz transformation equations.
2. Attempt any two parts of the following: $(2 \times 5 = 10)$
- (a) What was the objective of Davison-Germer experiment? Discuss the results of this experiment.
 - (b) An electron is confined to move between two rigid walls separated by 1 \AA . Find the de Broglie wavelength representing the first three allowed energy states of the electron and their corresponding energies.
 - (c) Derive Maxwell-Boltzmann Distribution law for N number of distinguished particles.
- Attempt any two parts of the following: $(2 \times 5 = 10)$
- (a) Explain the construction and working of Huygens eyepiece. Locate the positions of cardinal points with suitable depiction.
 - (b) Derive an expression for the intensity distribution due to Fraunhofer diffraction at a single slit and show that the intensity of the first subsidiary maximum is about 4.5% of that of the principal maximum.
 - (c) Discuss the production and detection of linearly, circularly and elliptically polarized light.
- Attempt any two parts of the following: $(2 \times 5 = 10)$
- (a) Describe the phenomena of interference due to wedge-shaped thin film obtain the conditions of maxima and minima also find the expression for fringe width.
 - (b) Define phase velocity and group velocity. Show that the group velocity is always equal to the particle velocity.
 - (c) An electron has de Broglie wavelength $2 \times 10^{-12} \text{ m}$. Find its kinetic energy. Also, find the phase and group velocities of its de Broglie waves.

5. Attempt any two parts of the following: $(2 \times 5 = 10)$

- (a) What are the essential requirement for laser? Explain the construction and working of He-Ne Laser with suitable diagram.
- (b) (i) An optical fibre has an NA of 0.20 and a cladding refractive index of 1.59. Determine angle for the fibre in water, which has refractive index of 1.33.
(ii) Explain the light propagation in an optical fibre.
- (c) Discuss the construction and reconstruction of image with the help of hologram.

Roll No. 9 6 1 5 6 2 3 8 1 5 5

B. Tech. Second Semester (CE & EC)
Major paper Examination 2015-16

Subject Code : BAS-09

Subject Name : Engineering Chemistry

Time: 03 Hrs.

Max. Marks: 40

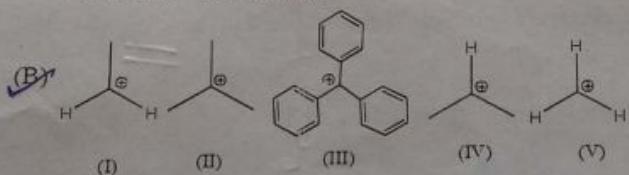
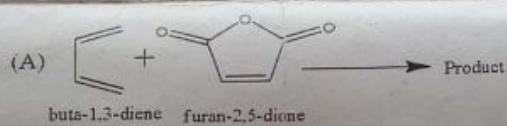
Note: Attempt all questions.

Q1. Attempt any three of the following questions. Q.1 (a) is compulsory.

- (a) Explain: i) bivariant, ii) univariant and iii) invariant system in the phase diagram of water. (4)
- (b) Discuss the difference between nematic and smectic liquid crystal with example. (3)
- (c) Discuss the following type of cubic structure: i) simple cubic, ii) body-centred cubic and iii) face-centered cubic. (3)
- (d) Give molecular orbital diagrams and calculate the bond order of HF and CO. (3)

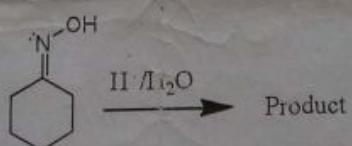
Q2. Attempt any three of the following questions. Q.2 (a) is compulsory.

- (a) Complete reactions (A) and explain. In part (B) arrange I, II, III, IV and V into decreasing order in term of carbocations stability and explain. (4)



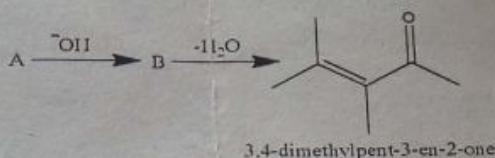
- (b) What is dihedral angle? Draw the energy diagram of butane conformation in respect to dihedral angle from 0°C - 360°C. (3)

- (c) Complete this reaction with mechanism. (3)



(d) Find A and B, explain with suitable mechanism.

(3)



Q3. Attempt any three of the following questions. Q.3 (a) is compulsory.

(a) What are the characteristic of good fuels? 0.98g weight of fuel contains 90% of C (4) and 8% of H. The bomb calorimeter details are: amount of water = 1450g; water equivalent of the calorimeter = 450g; rise in temperature of water = 1.8°C; latent heat of steam = 587cal/g and specific heat of water = 1cal/g. Calculate the **HCV** and **LCV**.

(b) Write an explanatory note on conducting polymers with examples. (3)

(c) Draw the flow diagram of Portland cement manufacturing by rotary kiln (3) technology. Also write the chemical reaction involve in formation of clinker.

(d) Synthesis of poly-methylmethacrylate (PMMA) by using free radical (3) polymerization with mechanism.

Q4. Attempt any three of the following questions. Q.4 (a) is compulsory.

(a) List all the electronic transitions possible for (a) CH₄, (b) CH₃Cl, (c) H₂C=O and (d) H₂C=CH₂. (3)

(b) Give the applications of IR spectroscopy.

(c) What do you understand by the position of the signal in a NMR spectrum? How many ¹H-NMR signals are expected in the following compound: (a) CH₃-CH₂-CH₃, (b) CH₂=CH₂, (c) (CH₃)₂C=O and (d) C₆H₅-CH₃. (3)

(d) What do you mean by water softening? Explain the lime - soda process for water softening. (3)

Time: 2 Hrs

Notes: Attempt all questions.

Max. Marks: 20

1. Attempt any three parts of the following. Q. 1(a) is compulsory.

- (a) Find the value of the voltage source (V_s) that delivers 6 Amps current through the circuit as shown in Fig.1. Using star-delta transformation.

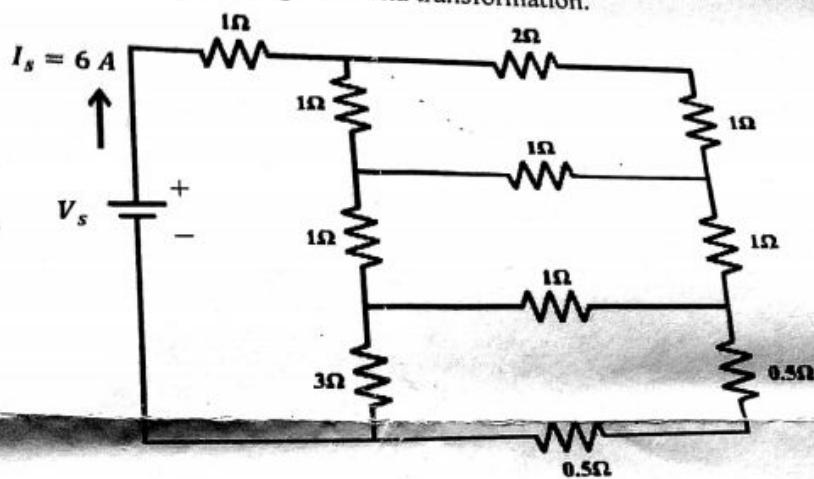


Figure 1

- (b) State and prove maximum power transfer theorem for d.c. network. 2
- (c) Explain the following term average and effective values for
(i). Sinusoidal waveform
(ii). Square waveform 2
- (d) A voltage $V(t) = 141.4 \sin(314t + 10)$ is applied to a circuit and the steady current given by $i(t) = 14.14 \sin(314t - 20)$ is found to flow through it.
Determine:
(i). The p.f. of the circuit (comment on load behaviour)
(ii). The power delivered to the circuit.
(iii). Draw the phasor diagram.

2. Attempt any Two parts of the following. Q. 2(a) is compulsory.
- (a) For the following circuit shown in Fig. 2, find the voltage across the load resistance $R_L = 6 \Omega$ (or terminal a-b) using superposition's theorem. 4

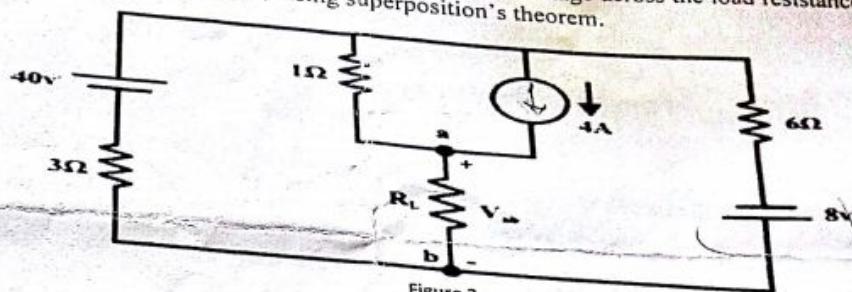


Figure 2

- (b) Write a short note with suitable example
 (i). Mesh Analysis method
 (ii). Nodal Analysis 2
- (c) Use Thevenin's theorem, to find the value of load resistance R_L in the circuit of Fig. 3 which results in the production of maximum power in R_L . Also, find the value of this maximum power. All resistances are in ohms. 2

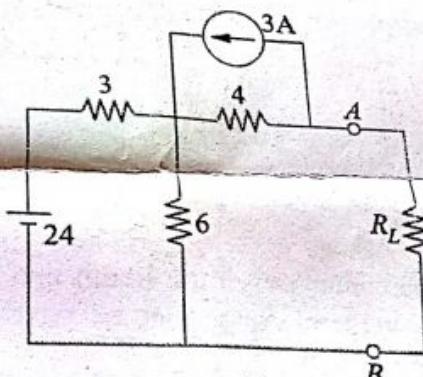


Figure 3

3. Attempt any Two parts of the following. Q. 3(a) is compulsory.

(a) The input power to a 3-phase induction motor running on a 400 V, 50 Hz supply was measured by two-wattmeter method. The readings were 10 kW and -2 kW. Calculate (i) the total input power, (ii) the power factor, and (iii) the line current. What is the load power factor when both wattmeters read identical? 4

(b) A series LC circuit has $Q = 70$, $L = 100 \mu H$, and $C = 2500 \mu F$. Find (i) the resonant frequency, (ii) the half-power frequencies, (iii) bandwidths and (iv) quality factor. 2

(c) What are the necessity and advantage of using 3-phase system? Derive $V_L = \sqrt{3}V_{ph}$ for star connection and $I_L = \sqrt{3}I_{ph}$ for delta connection. 2

NOTE:- Attempt All questions.

1. Attempt any three parts of the following. Q. 1(a) is compulsory.
 - (a) Draw the circuit diagram of FWR having $PIV = E_M$ with π filter. (4)

A HWR is used to supply 30V_{dc} to a resistive load of 500 ohms. The diode has a forward resistance of 25 ohm. Find the maximum value of ac voltage required at the input.
 - (b) An ideal Ge p-n junction diode has at a temperature of 125°C a reverse saturation current of $35\mu A$. Find the dynamic resistance for a 0.2V bias in.
 - (i) Forward direction
 - (ii) Reverse direction
 - (c) Explain the operation of PNP transistor Draw it's characteristics in CB configuration indicate different regions of operation. (2)
 - (d) Define α and β of transistor and interrelate them. What is the value of α for a BJT that has a β of 90. Find the base and emitter current if the collector current is 4mA. (2)
2. Attempt any two parts of the following. Q. 2(a) is compulsory.
 - (a) Write the major differences between normal p-n junction diode and zener diode. Explain the mechanism of zener breakdown. Explain the operation of zener diode as a voltage regulator circuit. (4)
 - (b) What are the differences between linearly graded and step graded p-n junction. Discuss the capacitive effect of a step graded p-n junction when it is in forward bias. (2)
 - (c) Derive the expression for the efficiency of HWR. Show that the maximum dc output power in HWR occurs when the load resistance equals the diode forward resistance. (2)
3. Attempt any two parts of the following. Q. 3(a) is compulsory.
 - (a) Define h parameters of transistors. Write the advantages of h parameters. Draw the circuit model of CE transistor using h parameters at low frequency. Derive the expression for current gain. (4)
 - (b) Draw the potential divider biasing circuit and explain how it maintain constant I_C ? Derive the expression for it's stability factor. (2)
 - (c) What is Early effect in transistors explain? Mention it's consequences on the performance of transistors (2)

BME-02

Roll No.

2017061048

B. Tech.

1st SEMESTER

MID TERM EXAMINATION 2017 - 2018

Fundamentals of Mechanical Engineering

Time: 2 Hrs.

Note: Answer all questions.

Max. Marks: 20

- Q.1** Attempt any Three parts of the following. Q. 1(a) is compulsory. 4
(a). What do you understand by thermodynamic equilibrium? Also explain all thermodynamics law in brief. 4
(b). Steam at 1000 kPa and 300° C enters an engine and expands to 20 kPa. If the exhaust steam has a dryness fraction of 0.9, make calculations for the drop in enthalpy and change in entropy. 2
(c). What do you mean by boiler? Also explain the working of Babcock Wilcox boiler with the help of neat sketch. 2
(d). Define error and relative error. Also explain different types of error. 2
- Q.2** Attempt any Two parts of the following. Q. 2(a) is compulsory. 2
(a). What do you mean by I C Engine? Explain working of 4-stroke diesel engine with the help of neat sketch. 4
(b). What do you mean by Refrigeration? Differentiate between Vapour compression and vapour absorption cycles. 2
(c). Explain the working of steam engine with the help of neat sketch. Also draw indicator diagram of steam engine. 2
- Q.3** Attempt any Two parts of the following. Q. 3(a) is compulsory. 2
(a). Explain ferrous and non-ferrous metal. Also explain different types of cast iron and its compositions. 4
(b). What do you mean by copper alloy? Also explain its applications. 2
(c). Differentiate between sensor and transducers. Also explain different types of transducers. 2

Q. 1 Attempt any three of the following. Q. 1(a) is compulsory.

Note: Attempt all questions.
Time: 2 hrs.
B.Tech.
EVEN SEMESTER
Minor Test 2017-2018
Engineering Chemistry

Max. Marks: 20

(a) With the help of molecular orbital diagram, calculate the bond order and explain the magnetic behavior of the following:
 NO , CO , HF , He^{2+} , N_2 , and N_2^- .

(b) Write short note on fullerenes, indicating the method of preparation, properties and their applications.

(c) i) What are inductive, mesomeric and hyperconjugative effects? Explain with examples.
 ii) Differentiate between SN_1 and SN_2 reactions.

(d) i) Which of the following molecules is chiral?
 ii) Which of the following carbonium ion is most stable
 $(\text{CH}_3)_3\text{C}^+$, $(\text{CH}_3)_2\text{HC}^+$ and $\text{CH}_3\text{H}_2\text{C}^+$.
 Justify your answer in terms of +I and hyperconjugative effect.

Q. 2 Attempt any two of the following. Q. 2(a) is compulsory.

(a) i) State the phase rule and explain the terms involved in it.
 ii) Draw a neat labelled phase diagram of water system and explain areas, curves and triple point in it.

iii) Find the number of degrees of freedom in following systems. Name the variables that could correspond to these degrees of freedom.

b) Water (liquid) \rightleftharpoons Water vapour at 1 atmosphere pressure

c) Derive Bragg's equation for diffraction of X-rays by crystal. In Bragg's reflection of X-ray, a reflection was found at 30° with lattice plane of spacing 1.87\AA . If this is a second order reflection, calculate the wavelength of X-rays.

i) Gold crystallizes into an FCC structure. The edge length of the FCC unit cell is 4.07\AA . Calculate the density of gold if its atomic weight is 197.

ii) Name different liquid crystalline phases. Which type of molecules give rise to cholesteric liquid phase?

Q. 3 Attempt any two of the following. Q. 3(a) is compulsory.

- (a) Write the mechanism of any two of the following:
i) Beckmann rearrangement ii) Diels-Alder reaction iii) Cannizzaro reaction. (4)
- (b) What are different types of organic reactions? Explain them with one example each. (2)
- (c) i) Classify the following as electrophiles and nucleophiles
a) CN^- b) H_2O c) Br^+ d) NH_3 e) ROH f) RNH_2 g) $\text{S}^+\text{O}_3\text{H}$ h) AlCl_3 i) BF_3
ii) Describe E and Z notations with example. (2)