

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)  $\text{CN}^-$  b)  $\text{H}_2\text{O}$  c)  $\text{Br}^+$  d)  $\text{NH}_3$  e)  $\text{ROH}$  f)  $\text{RNH}_2$  g)  $\text{S}^+\text{O}_3\text{H}$  h)  $\text{AlCl}_3$  i)  $\text{BF}_3$   
ii) Describe E and Z notations with example. (2)

B.Tech.  
EVEN SEMESTER  
Minor Test 2017-2018  
Engineering Chemistry

Max. Marks: 20

Time: 2 hrs.

Note: Attempt all questions.

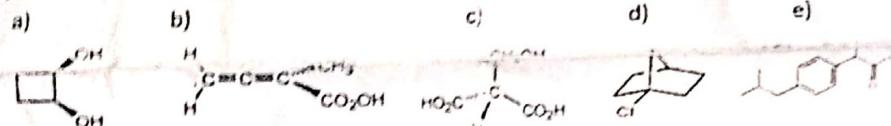
Q.1 Attempt any three of the following. Q. 1(a) is compulsory.

(a) With the help of molecular orbital diagram, calculate the bond order and explain the magnetic behavior of the following: (4)  
 $\text{NO}$ ,  $\text{CO}$ ,  $\text{HF}$ ,  $\text{He}^{2+}$ ,  $\text{N}_2$ , and  $\text{N}_2^-$

(b) Write short note on fullerenes, indicating the method of preparation, properties and their applications. (2)

(c) i) What are inductive, mesomeric and hyperconjugative effects? Explain with examples. (2)  
 ii) Differentiate between  $\text{S}^{\text{N}}1$  and  $\text{S}^{\text{N}}2$  reactions.

(d) i) Which of the following molecules is chiral? (2)



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. (4)

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.

a) Water (liquid)  $\rightleftharpoons$  Water vapour

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

(b) Derive Bragg's equation for diffraction of X-rays by crystal. In Bragg's reflection of X-ray, a reflection was found at  $30^\circ$  with lattice plane of spacing  $1.87\text{ \AA}$ . If this is a second order reflection, Calculate the wavelength of X-rays. (2)

(c) i) Gold crystallizes into an FCC structure. The edge length of the FCC unit cell is  $4.07\text{ \AA}$ . Calculate the density of gold if its atomic weight is 197 (2)  
 ii) Name different liquid crystalline phases. Which type of molecules give rise to cholesteric liquid phase?

B.Tech.  
EVEN SEMESTER  
Major Examination 2017-2018  
Subject Name: Engineering Chemistry

Time: 3 hrs.

Max. Marks: 50

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

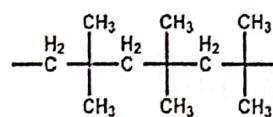
Q.1 Attempt any five of the following.

- (a) Account for paramagnetic behavior of oxygen on the basis of molecular orbital theory. 2
- (b) What is meant by inter-molecular and intra-molecular H-bonding? 2
- (c) Calculate the number of atoms per unit cell in simple cubic (SC), body centred cubic (BCC) and face centred cubic (FCC). 2
- (d) Calculate the angle at which first order reflection and second order reflection will occur in X-ray spectrometer when X-rays of wavelength  $1.54\text{\AA}$  are diffracted by the atom of a crystal, given that the interplaner distance is  $4.04\text{\AA}$ . 2
- (e) In the phase diagram of water system, explain i) a bivariant system, ii) an univariant system. 2
- (f) Draw the potential energy diagram for the various conformations of n-butane. 2
- (g) Write short note on Aldol condensation. 2

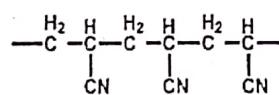
Q.2 Attempt any two of the following.

- (a) Differentiate between thermoplastics and thermosets. 5
- (a) Write the difference between addition polymer and condensation polymer with example. 5  
216g of 1, 3-butadiene is copolymerized with 104g of styrene. Determine the molecular formula of the copolymer?
- (b) Write short note on the following. 5
  - a) PMMA
  - b) Atactic polymer
  - c) Isotactic polymer
  - d) Vulcanization of natural rubber
- (c) Identify the repeating unit in the following structure and state the name of the monomer. 5

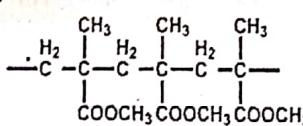
a)



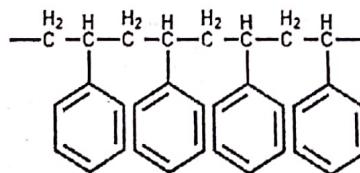
b)



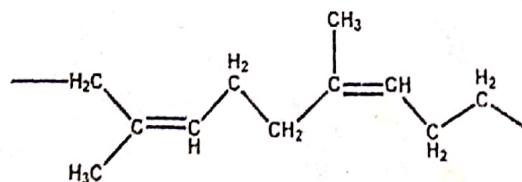
c)



d)



e)



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 value?

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 = 1000g, Latent heat of steam = 587 cal/g).

(c) Give the structure of the following polymers.

a) SBR b) NBR c) Orlon 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 0.0001g/l gave 0.2 absorbance value when measuring using 1.0cm cell. Calculate molar extinction coefficient.

5

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

5

(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.

5

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.

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

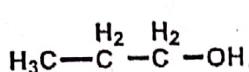
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Find the number of fundamental vibrations for the following molecules as under. Monoatomic (Ne), Diatomic (HCl), triatomic linear molecule (CO<sub>2</sub>) and triatomic non-linear (H<sub>2</sub>O) molecules.

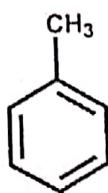
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(c) Define chemical shift. Show the expected NMR signals and their splitting in the following compounds.

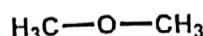
a)



b)



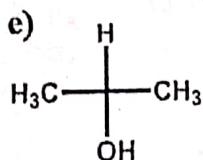
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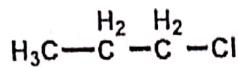
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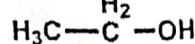
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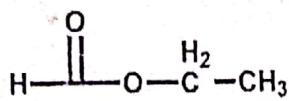
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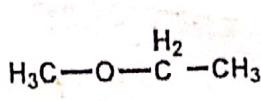
g)



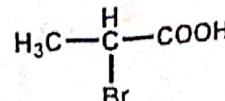
h)



i)



j)



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  $3000 \text{ m}^3$  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:

(2 x 5 = 10)

(a) Derive electromagnetic wave equation in dielectric medium and discuss its solution.

(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  $\frac{\epsilon}{\epsilon_0} = 12$  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:

(2 x 5 = 10)

(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:

(2 x 5 = 10)

(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  $\mu_p = 3700 \text{ cm}^2/\text{Vs}$  and  $\mu_n = 3600 \text{ cm}^2/\text{Vs}$  for germanium.

B. Tech.  
 Year: 1<sup>st</sup> Semester: 2<sup>nd</sup>  
 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)
  - i. Find the inverse Laplace transform of  $\frac{As+B}{Cs^2+Ds+E}$ .
  - ii. Find the inverse Laplace transform of  $\frac{e^{-s}}{s^4+4a^4}$ .

Q. 3 Attempt any two parts of the following.

2\*5=10

(a) Solve the following differential equation using Laplace transform

$$x'' + 9x = \cos 2t, \text{ if } x' = \frac{dx}{dt}, x(0) = 1 \text{ and } x\left(\frac{\pi}{2}\right) = -1.$$

(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

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

(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.

2\*5=10

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

$<5<$   
 $-5 < x < 5$

Hence find the value of

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

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

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

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

$$\text{deduce } \frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} + \dots = \frac{\pi^2}{32}.$$

B. Tech. (EC/EE/ ME/CH)  
EVEN SEMESTER  
MAJOR EXAMINATION 2017 - 2018

Introduction to Computer Programming

Time: 3 Hrs.

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

Max. Marks: 50

1. Attempt any five parts of the following:

(5 × 2 = 10)

(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.  
 $1 - x^2/!2 + x^4/!4 - \dots$

(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

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

ii) void main()

```
{
    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:

(2× 5 = 10)

- (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.
- (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", x );
}
```

### 4. Attempt any two parts of the following:

(2× 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:

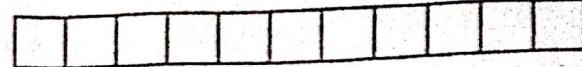
(2× 5 = 10)

- (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 × B = {{1, 3}, {1, 4}, {2, 3}, {2, 4}}



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

Subject Name: Electrical Circuit and Analysis

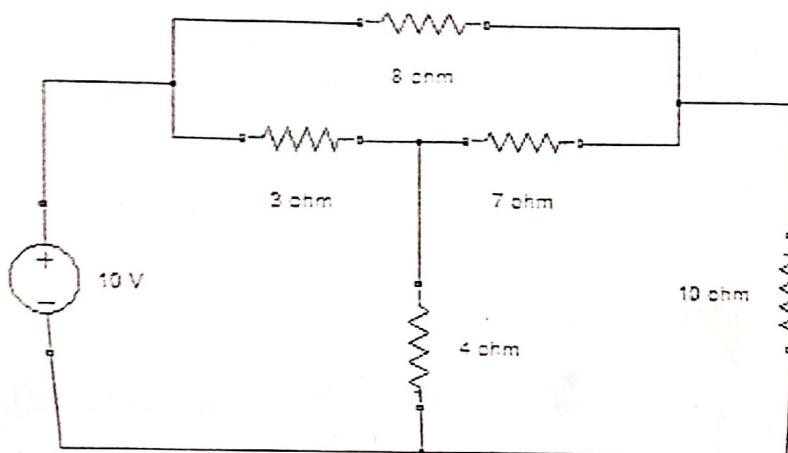
Time: 3 Hrs.

Max. Marks: 50

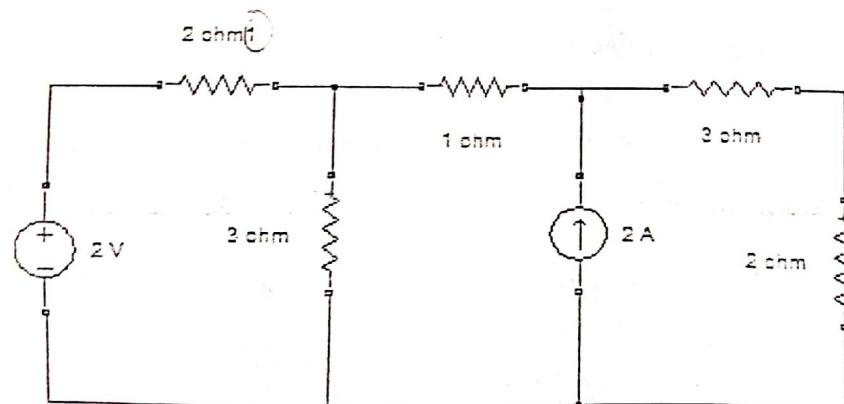
Note: Attempt all questions. Each question carry equal marks.

1. Attempt any four parts of the following:  $(4 \times 2.5 = 10)$

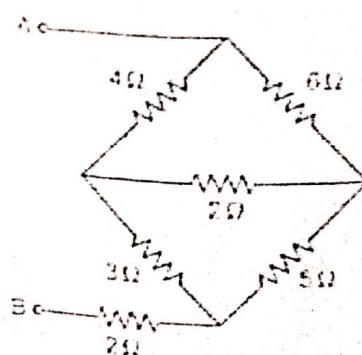
- (a) Using Mesh analysis find current in 8 ohm resistance.



- (b) Find current in 1 ohm resistance using Thevenin's theorem.



- (c) Find resistance across AB using star-delta transformation.



- (d) Three alternating currents are given by,  
 $i_1 = 141\sin(\omega t + \pi/4)$ ,  $i_2 = 30\sin(\omega t + \pi/2)$ ,  $i_3 = 20\sin(\omega t - \pi/6)$ , and are fed into a conductor. Find the equation of resultant current and its r.m.s. value.
- ~~(e)~~ Two circuits having the same numerical impedances are connected in parallel. The power factor of one circuit is 0.8 and of the other is 0.6. What is the power factor of the combination?
- ~~(f)~~ If the bandwidth of a resonant circuit is 10 kHz and the lower half power frequency is 110 kHz. What is the value of the upper half power frequency? What is the value of quality factor.  $(2 \times 5 = 10)$

2. Attempt any two parts of the following:

- ~~(a)~~ Draw the phasor diagram of three phase delta connected lagging power factor balanced load fed with three phase balanced supply and derive the expression for power.
- ~~(b)~~ Three identical resistors of 20 ohm are connected in star to a three phase, 415 V supply. (i) Calculate the total power taken by load, (ii) Also calculate the power consumed by the resistors if load are connected in delta, and (iii) If one of the resistors is open circuited in each case, calculate the power consumed.
- (c) A balanced three phase star connected load of 120 kW takes a leading current of 100 A when connected to a three phase, 3.3 kV, 50 Hz supply. Determine the impedance, resistance, capacitance and power factor of the load.

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

- (a) An iron ring is made up of three parts:  
 $I_1 = 10 \text{ cm}$ ,  $A_1 = 5 \text{ cm}^2$        $\sigma_{s-}$   
 $I_2 = 8 \text{ cm}$ ,  $A_2 = 3 \text{ cm}^2$        $0.05 \times 0.05$   
 $I_3 = 6 \text{ cm}$ ,  $A_3 = 2.5 \text{ cm}^2$        $= 0.05 \times 10^{-4} \text{ m}^2$

It is wound with a coil of 250 turns. Calculate current required to produce the flux of 0.4 mWb.  
 $\mu_1 = 2670$ ,  $\mu_2 = 1050$ ,  $\mu_3 = 600$

- ~~(b)~~ Explain magnetic hysteresis and draw B-H curve. What is utility of this curve. Also explain fringing and leakage in magnetic circuit.
- (c) When the two identical coils are connected in series, the inductance of the combination is found to be 80 mH. When connections to one of the coils are reversed, a similar measurement indicates 20 mH. Find the coupling coefficient of the coils.

4. Attempt any two parts of the following:

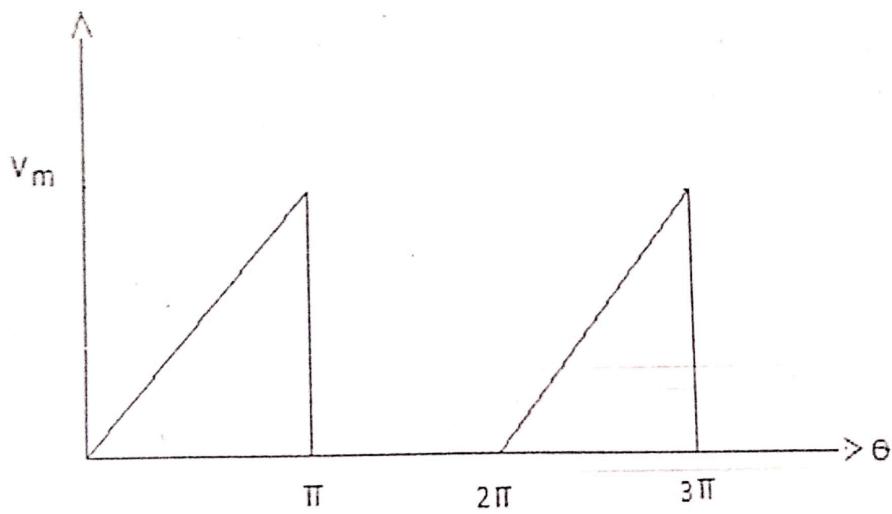
$(2 \times 5 = 10)$

- ~~(a)~~ A coil of 10 H inductance and  $5\Omega$  resistance is connected in parallel with a  $20\Omega$  resistor across a 100 V d.c. supply which is suddenly disconnected. Find; (i) the initial rate of change of current after switching, (ii) the voltage across  $20\Omega$  initially, and after 0.3 second.
- (b) Describe the transient response of R-L-C series circuit with dc voltage and explain over damping, critical damping and under damping.
- ~~(c)~~ A 150 V battery has been switched on across a circuit consisting of a  $20\mu\text{F}$  capacitor in series with a  $100\Omega$  resistor. Deduce an expression for the subsequent current /time relationship and calculate (i) time constant; (ii) the initial current and, (iii) the final current.

Attempt any two parts of the following:

( $2 \times 5 = 10$ )

- (a) Determine the Fourier series for the waveforms shown in figure given below, and also calculate the amplitude of fundamental, third and fifth order harmonics.



- (b) A non sinusoidal voltage  $v = 80 \sin \omega t + 30 \sin(3\omega t + \pi/6) + 15 \sin(5\omega t + \pi/3)$  is fed across a circuit and current is given by  $i = 0.8 \sin(\omega t - \pi/10) + 0.14 \sin(3\omega t - 2\pi/24) + 0.2 \sin(5\omega t - 3\pi/4)$ . Find (i) r.m.s. value of current and voltage, and (ii) total power supplied.

- (c) What is earthing. State its advantages. Describe general method of earthing done at residences state why earthing wire is thick in comparison to phase wire.

**B. Tech. I  
ODD SEMESTER  
MAJOR EXAMINATION 2017- 2018**  
**Environment & Ecology**

Time: 3 Hrs.

Max. Marks: 50

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

1. **Attempt any four parts of the following:**  $(4 \times 2.5 = 10)$
- (a) What are the major components of an ecosystem?
  - (b) Define ecological pyramid. Draw an ecological pyramid of energy and give its characteristics.
  - (c) What do you mean by ecological succession. Briefly explain its types.
  - (d) Write a note on Hot-spots of biodiversity.
  - (e) Discuss the values of biodiversity.
  - (f) Give difference between (a) Grassland and Aquatic ecosystem (b) Genetic biodiversity and species biodiversity.
2. **Attempt any two parts of the following:**  $(2 \times 5 = 10)$
- (a) What is ozone hole? How it is formed? What are the effects of depletion of ozone layer?
  - (b) What do you mean by pollution. Explain cause and effects of air pollution. Explain its control measures.
  - (c) Write note on (a) Acid rain (b) Thermal Pollution.
3. **Attempt any two parts of the following:**  $(2 \times 5 = 10)$
- (a) What is water pollution. Give its causes. Explain its control measures.
  - (b) Write down a short note on solid waste management.
  - (c) Define greenhouse effect. Discuss its causes and consequences.
4. **Attempt any two parts of the following:**  $(2 \times 5 = 10)$
- (a) Explain role of government in environmental protection.
  - (b) Give characteristic features of (a) Wildlife protection act  
(b) Forest conservation act
  - (c) Give characteristic features of (a) Air protection act  
(b) Water protection act
5. **Attempt any two parts of the following:**  $(2 \times 5 = 10)$
- (a) Write a note on women and child welfare. What are the steps taken by govt. for women and child welfare?
  - (b) What are the initiatives taken by NGO's for environmental protection?
  - (c) Give short note on (a) National parks  
(b) Biosphere reserves

Paper Code	BEC-01
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Roll No.	2	0	1	7	0	4	1	1	0	6	
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Odd Year 1<sup>st</sup> Semester 1<sup>st</sup>

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  $10^{\circ}\text{C}$  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 and 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  $I_{DSS} = 40\text{mA}$ ,  $V_P = -10\text{V}$ , 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**

(2x5)=10

- (a) Minimize the following expressions using Boolean identities and Theorems.

$$AB + \overline{AC} + \overline{ABC}(AB + C)$$

$$\overline{AB} + ABD + \overline{ABC}\overline{D} + BC$$

- (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

- (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  $5 \times 10^5$  and CMRR is 80dB. Calculate the output voltage and % error due to common mode.

4.

**Attempt any two parts of the following**

(2x5)=10

- (a) Compare ~~A~~ 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.

$$\text{int} \quad V_{in} = \frac{V}{T} t$$

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.

B. Tech. I  
 ODD SEMESTER  
 MAJOR EXAMINATION 2017 - 2018  
 Subject Name: Engineering Physics-I

Max. Marks: 50

Time: 3 Hrs.

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

$$(4 \times 2.5 = 10)$$

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  $E = pc$ .
- (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  $1 \text{ A}^0$ . 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.

$$(2 \times 5 = 10)$$

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.

4. 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.

**ODD SEMESTER**  
**MAJOR EXAMINATION 2017 - 2018**

Subject Name: : Engineering Mathematics-I

Time: 3 Hrs.

Max. Marks: 50

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

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  $B = A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ .

2. Attempt any two parts of the following:

(2 × 5 = 10)

(a) 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  $\rho(x, y, z) = k\sqrt{xyz}$ .

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

4. Attempt any two parts of the following:

(2×5 = 10)

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

(ii) Show that  $\operatorname{div}(\operatorname{grad} f(r)) = \frac{d^2}{dr^2} f(r) + \frac{2}{r} \frac{d}{dr} f(r)$ , 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  $\phi$  and hence find  $\phi$ .

5. Attempt any two parts of the following:

(2×5 = 10)

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

(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  $y = \frac{2x}{\pi}$ .

Name of the Course: B. Tech-I year

Odd/Even Semester

Minor Examination: 2017-18

Subject Name: Engineering Mathematics -I

Max. Marks: 30

Time: 2 hrs.

Note: Answer all questions.

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

4

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

3

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

3

(c) 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

(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  $n$ .

3

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

4

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

3

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

3

(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.

3

(d) 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.

4

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

$$10y + 3z = 0$$

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

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

$$x + 2y = 4$$

(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  $2x + y + 2z = 0$   $x + y + 3z = 0$   $4x + 3y + b z = 0$  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

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

**B.Tech 1<sup>st</sup> Year (EC,EE & ME)**  
**Minor Test- Session 2017-2018**  
**(ODD SEMESTER)**

**SUBJECT: FUNDAMENTALS OF ELECTRONICS ENGINEERING****TIME:- 2 Hours****M.M. 20****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
- $\pi$
- 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. (2)

- (i) Forward direction
- (ii) Reverse direction

- (c) Explain the operation of PNP transistor Draw it's characteristics in CB configuration (2) indicate different regions of operation.

- (d) Define
- $\alpha$
- and
- $\beta$
- of transistor and interrelate them. What is the value of
- $\alpha$
- for a BJT that has a
- $\beta$
- of 90. Find the base and emitter current if the collector current is 4mA. (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 (4) the mechanism of zener breakdown. Explain the operation of zener diode as a voltage regulator circuit.

- (b) What are the differences between linearly graded and step graded p-n junction. Discuss (2) the capacitive effect of a step graded p-n junction when it is in forward bias.

- (c) Derive the expression for the efficiency of HWR. Show that the maximum dc output (2) power in HWR occurs when the load resistance equals the diode forward resistance.

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 (4) model of CE transistor using h parameters at low frequency. Derive the expression for current gain.

- (b) Draw the potential divider biasing circuit and explain how it maintain constant
- $I_C$
- ? Derive (2) the expression for it's stability factor.

- (c) What is Early effect in transistors explain? Mention it's consequences on the performance (2) of transistors

$$I_{dc} = \frac{30}{500} = 0.06 A.$$

B.TECH 1ST YEAR

ODD SEMESTER

MINOR TEST 2017-18

Time- 2 hr.

Max. Marks-30

Note: Answer all questions.

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

- a) Define communication and discuss the process with all necessary components. 4
- b) What is technical communication? Differentiate it from general communication comparing all aspects. 3
- c) What is a sentence? Describe different types of sentences with examples. 3
- d) Explain inductive order of paragraph development and develop a paragraph in the mentioned order. 3

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

- a) Discuss language as tool of communication emphasizing all the features. 4
- b) Explain 7 C's of communication in detail. 3
- c) Demarcating barrier of communication concern it setting up communication barriers. 3
- d) Describe the flow of communication in an organization with a specific illustration. 3

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

- a) Answer the following: 4
- One word substitution-
- a) Study of sound

ii. Give antonyms-

a) Elastic

iii. Synonym of-

a) Obscure

iv. Offer meanings of the following homophones-

a) weather, wither

b) bear, bare

b) Not readable

b) Ratify

b) Malign
- Fill in the blanks.
  - Suitable preposition-

- a) This ring is made .....gold. (from/ for/of)
- b) The universe is encircled..... certain laws.(by/with/to)

ii. Appropriate articles-

- a)....temple of Shiva in Nepal is known as.....temple of Pashupatinath.
- b) We should give the arm to .....man in need.

iii. Proper conjunctions-

- a)He is intelligent.....arduous.
- b)I am in dilemma about.....to go or to stay.
- c) Define periodic and loose sentence with two examples of each
- d) Write a short note on chronological method of paragraph writing with example.

Name of the Course: B. Tech-I year

Odd Semester

Minor Examination: 2017-18

Subject Name: Engineering Physics -I

Max. Marks: 20

Time: 2 hrs.

Note: Answer all questions.

- Q.1** Attempt any three parts of the following. Q. 1(a) is compulsory.
- 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  $w=ict$ ,  $i=(-1)^{1/2}$ .
  - 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)  $c$ .
  - Explain the difference between classical statistics and quantum statistics. Write down the statistical distribution function in each case.
  - 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.
- Q.2** Attempt any two parts of the following. Q. 2(a) is compulsory.
- 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 Å wave-length? (Speed of Earth  $v=3 \times 10^4$  m/s).
  - Calculate the velocity of watch when it seems to be slowed down by 1 minute in 1 hour.
  - What is relativistic energy? Obtain the expression  
 $E^2=p^2c^2+m_0^2c^4$
- Q.3** Attempt any two parts of the following. Q. 3(a) is compulsory.
- 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  $\psi_1$ ,  $\psi_2$ ,  $\psi_3$  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.
  - What are the fundamental postulates of statistical Mechanics? Compare the salient features of MB, BE and FD statistics.
  - Derive the time dependent Schrodinger wave equation. Give significance of the equation.

Roll No.	2	0	1	7	0	4	1	1	0	6
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**B. Tech.-I**  
**(SEM. I) Odd Semester (CE, EC & CS)**  
**Minor Test 2017-2018**  
**Subject Name: Environment & Ecology**

Time: 02:00 Hrs.

**Max. Marks: 30****Note:** Answer all question.

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

- (a). What is Food Resources and integrated crop management? Explain. 4
- (b). Write down the scope and importance of Multidisciplinary Nature of Environmental Studies. 3
- (c). What is Ecological Succession? Explain with suitable example. 3
- (d). What is trophic level? Discuss its types with suitable examples. 3

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

- (a). What is water resources and sustainable water management? Explain 4
- (b). What is Natural Resources? Write down the associated problems with Natural Resources. 3
- (c). Explain the benefit and problems of dams. 3
- (d). Discuss the major uses of forests. How would you justify that ecological uses of forests surpass commercial uses? 3

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

- (a). What is biodiversity? Discuss the types and values of biodiversity. 4
- (b). What do you understand by energy flow in the ecosystem. Illustrate with suitable ecosystem. 3
- (c). Explain the different threats of biodiversity. 3
- (d). Explain the structure and function of Aquatic Ecosystem. 3

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

Subject Name- Electrical Circuit Analysis

Max. Marks: 20

Time: 2 Hrs.

Note: Answer all questions.

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

4

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

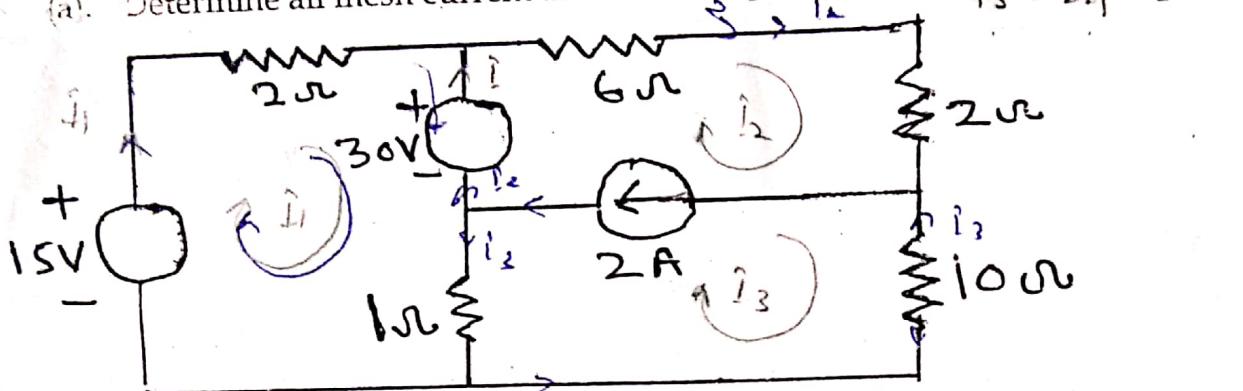


Figure.1

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

2

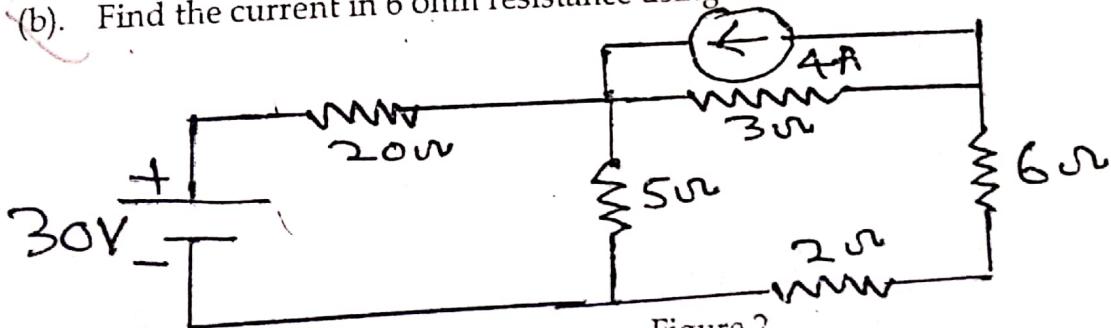


Figure.2

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

(d). Define the average value of a sinusoidal current. Derive an expression for the average 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 using Superposition theorem;

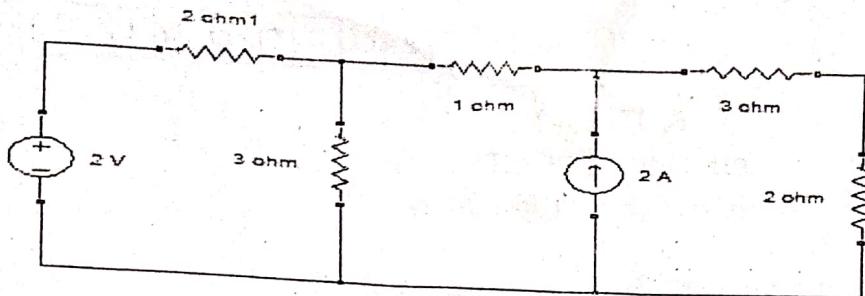


Figure.3

- (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.

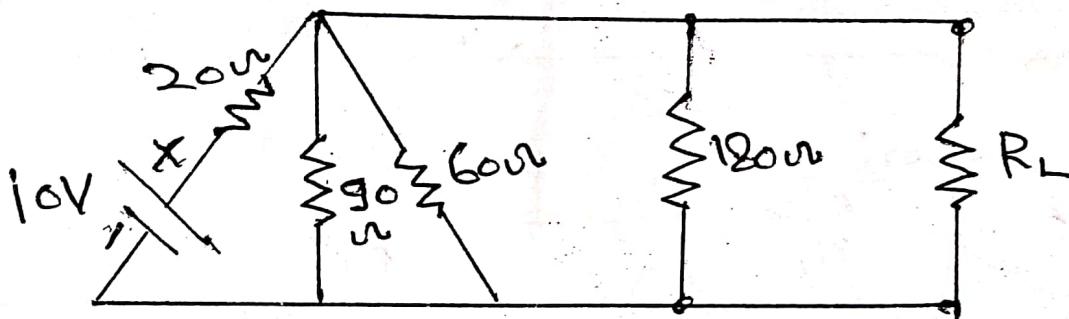


Figure.4

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

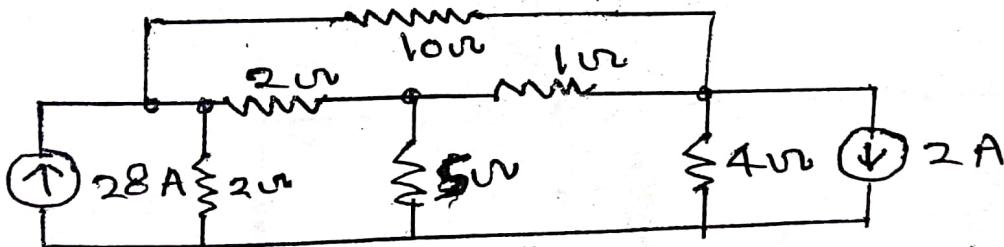


Figure.5

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  $100 \Omega$  resistors in parallel with  $60 \mu\text{F}$  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

$$V = \sqrt{ }$$

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

**Professional Communication**

Time: 3 Hrs.

Max. Marks: 50

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

1. Attempt any four parts of the following:  $(4 \times 2.5 = 10)$

- (a) Language is one of the tools of communication. Describe
- (b) Clarity and conciseness are features of technical communication. Explain
- (c) Describe merits and demits of written communication.
- (d) What is chronological method in paragraph writing? Write a paragraph on this method.
- (e) Do as directed in the brackets:
- i. Vice (change into adjective)
  - ii. Break(change into noun)
  - iii. Step-son(change into plural)
  - iv. Mr. Mehta is----M.P. from Gujarat (insert a suitable article).
  - v. A honorary Secretary is one who is not paid for this services.( correct)
- (f) What is a topic sentence? In which method of paragraph development does it find prime importance. Write a paragraph using topic sentence.

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

- (a) Write a letter to a Furniture Agency asking for quotation of prices for their steel furniture. Enquire also about the concession and the mode of payment
- (b) Write a letter of complaint to a firm, inventing the necessary details yourself.
- (c) You've seen an advertisement in Employment News in which applications are invited from Indian Professionals in MNC's. Prepare your C.V. and send to the concerned along-with a covering letter, without mentioning your name.

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

- (a) What is a solicited Proposal? Draft a proposal to the CEO of a company for purchase and installation of equipments you want in your office. Invent all the necessary details.
- (b) Write a report of a committee assigned to make investigation about the suitability of a building for shifting the branch office of State Bank of India from its present site.
- (c) What is a report? Giving relevance of report writing prepare the structure of a report.

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

- (a) What are the main parts of Presentation? What are the major techniques of

Presentation? Explain.

- (b) How is Group Discussion different from Presentation? What are the major techniques one should bear in mind while participating in GD?
- (c) What is nuance in a delivery of speech? How can one make nuances setting Voice Dynamics? Explain

5. Attempt any two parts of the following:

- (a) List the points that should be borne in mind while giving visual aids.
- (b) How do the audiences analyze the speakers? Write some tips from speakers point-of view in the course of presentation.
- (c) The body language plays a significant role during speech delivery. Write a note on the parts of body language.

B.Tech.  
EVEN SEMESTER  
Minor Examination 2017-18  
Subject: Engineering Physics-II

Time: 2 Hours

Max. Marks: 20

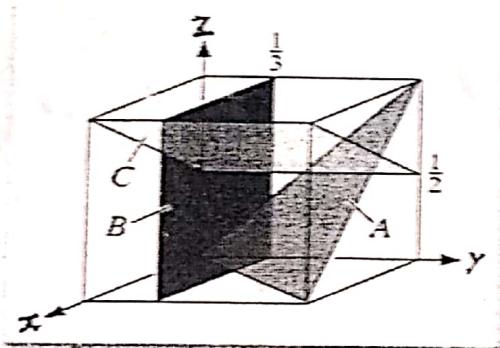
Note: Answer all questions

**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

**MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY**  
**GORAKHPUR –273010, UTTAR PRADESH, INDIA**

**BACHELOR OF TECHNOLOGY**  
**( SEMESTER – II ) EVEN SEMESTER**

**MAJOR EXAMINATION 2017 – 2018**

**SUBJECT NAME — *TECHNICAL WRITING***

**Time: 03 Hours**

**Maximum Marks: 50**

**Attempt all questions. All questions carry equal marks.**

**Q. 1. Offer Pivotal Traits of the following. Attempt any five.  $(5*2 = 10)$**

- (a). Technical Communication
- (b). Impersonal Style
- (c). Scientific Attitude
- (d). Listening Comprehension
- (e). General Writing
- (f). Key Words
- (g). Preface

**Q. 2. Attempt any two of the following.  $(2*5 = 10)$**

- (a). Analyze distinguishing features of *Formal Letters*.
- (b). Highlight the key components of a competent and functional *Curriculum Vitae*.
- (c). You wish to apply for the post of an Assistant Engineer in HCL OR Microsoft Company. Draft a *Covering Letter* addressing to the Vice President, Human Resources of any of the above said companies.

**Q. 3. Attempt any two of the following.  $(2*5 = 10)$**

- (a). What is the role of *Abstract* in *Report Writing*?
- (b). Describe meaning, definition and types of *Report*.
- (c). Differentiate between *Reference* and *Bibliography*.

Q. 4. Attempt any two of the following.

(2\*5 = 10)

- (a). What are the major factors one must consider while drafting a *Fresher's Resume*? Outline the layout of *Resume*.
- (b). State purpose of *Technical Seminar*. Discuss modes and methods of *Technical Seminar* in detail.
- (c). What are the key roles played by Body Language OR Non-Verbal postures and gestures in Job Interviews?

Q. 5. Attempt any two of the following.

(2\*5 = 10)

- (a). What do you mean by audience based delivery? Highlight the benefits of *audience analysis* in public demonstration and professional discourses?
- (b). Draft *Acknowledgements* for technical proposal prepared by you.
- (c). What pivotal roles can be played by the cohesive understanding of *Cross-Cultural Communication* in Multicultural, progressive and professional scenario of twenty first century?

**Madan Mohan Malaviya University of Technology**

**Gorakhpur, Uttar Pradesh**

**Bachelor of Technology**

**EVEN SEMESTER**

**Minor Examination 2017 – 2018**

**Subject Name — Technical Writing**

**Minor Test - I (Unit 1 + 2)**

**Session 2017 – 2018**

**Time: 02 Hours,**

**Maximum Marks: 30**

**Class/Year: B.Tech. First Year**

**Branch: Electronics & Communication (Second Semester)**

**Registration No.....**

**Attempt all the questions.**

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

- (a). What are the salient features of *Technical Writing*? Define *Technical Writing*. 4
- (b). Writing is a skill. Explain in context to the steps to be followed for good Writing. 3
- (c). What is *Scientific Attitude*? Describe in context of writing a paper on Technical Subject. 3
- (d). How will you distinguish between *Declaration* and *Certificate* in *Thesis Writing*? 3

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

- (a). Mention key points one must consider in due process of *Precis Writing*. 4
- (b). What are the different methods of Reading? Discuss. 3

- (c). What do you mean by ***Definition***? Define a subject of your own choice. 3  
(d). How is ***Technical Writing*** different from ***General Writing***? 3

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

- (a). What is ***Front Matter*** of a Thesis? Explain. 4  
(b). Comment on ***Preface*** and ***Acknowledgement***. 3  
(c). What is synopsis of a Research paper or thesis? Write the importance of synopsis? 3  
(d). Highlight the key points of ***Main Text or Main Body*** of Thesis Elements. 3

[Technical Writing Page 2 of 2]

**B-Tech. ECE**  
**Semester II Even Semester**  
**Major Examination 2017-18**  
**Knowledge Management**

**Time: 3Hrs.****Max. Marks: 50****Note: Attempt all questions. Each question carries equal marks.****1. Attempt any five parts of the following: (5\*2=10)**

- (a) Explain the meaning of Knowledge with the help of suitable examples.
- (b) Describe knowledge management with different perspective.
- (c) "Tacit knowledge tough to explore over Explicit Knowledge". Comments
- (d) Describe organizational knowledge management requirement.
- (e) "Knowledge Management System plays an important role in an Organization".  
Comments
- (f) Explain the Knowledge Management cycle with the help of examples.
- (g) Define organizational learning and describe the links between individual and organizational learning.

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

- (a) Discuss the relation of information technology towards knowledge management.  
Supports your answer with suitable examples.
- (b) Define the organizational culture. How organizational culture contributes in Knowledge management? Supports your answer with examples.
- (c) How does culture contribute to organizational innovation and success?

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

- (a) Discuss the link between organizational characteristics and organizational outcomes.
- (b) Define the meaning of sharing Knowledge. Also explain the step of Implementing Knowledge Management Program.
- (c) Discuss the need of Organizational Culture for Developments of Knowledge Management?

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

- (a) "Traditional Knowledge Management system has no longer fit today's environment".  
Comment on Statement in contrast of future of Knowledge management.
- (b) Describe the key challenges of Knowledge Management. Suggests the way overcome these challenges.
- (c) How Information technology can affects the future of Knowledge management.

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

- (a) Discuss the scope and issues of Knowledge management.
- (b) Discuss to what extent organizational culture can be managed. Support your answer with examples.
- (c) Explain the dynamic processes underlying performance improvement initiatives of Knowledge Management.

**B. Tech. I**  
**ODD SEMESTER**  
**MAJOR EXAMINATION 2017- 2018**  
**Environment & Ecology**

10

**Time: 3 Hrs.**

**Max. Marks: 50**

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

1. **Attempt any four parts of the following:**  $(4 \times 2.5 = 10)$ 
  - (a) What are the major components of an ecosystem?
  - (b) Define ecological pyramid. Draw an ecological pyramid of energy and give its characteristics.
  - (c) What do you mean by ecological succession. Briefly explain its types.
  - (d) Write a note on Hot-spots of biodiversity.
  - (e) Discuss the values of biodiversity.
  - (f) Give difference between (a) Grassland and Aquatic ecosystem (b) Genetic biodiversity and species biodiversity.
  
2. **Attempt any two parts of the following:**  $(2 \times 5 = 10)$ 
  - (a) What is ozone hole? How it is formed? What are the effects of depletion of ozone layer?
  - (b) What do you mean by pollution. Explain cause and effects of air pollution. Explain its control measures.
  - (c) Write note on (a) Acid rain (b) Thermal Pollution.
  
3. **Attempt any two parts of the following:**  $(2 \times 5 = 10)$ 
  - (a) What is water pollution. Give its causes. Explain its control measures.
  - (b) Write down a short note on solid waste management.
  - (c) Define greenhouse effect. Discuss its causes and consequences.
  
4. **Attempt any two parts of the following:**  $(2 \times 5 = 10)$ 
  - (a) Explain role of government in environmental protection.
  - (b) Give characteristic features of (a) Wildlife protection act  
(b) Forest conservation act
  - (c) Give characteristic features of (a) Air protection act  
(b) Water protection act
  
5. **Attempt any two parts of the following:**  $(2 \times 5 = 10)$ 
  - (a) Write a note on women and child welfare. What are the steps taken by govt. for women and child welfare?
  - (b) What are the initiatives taken by NGO's for environmental protection?
  - (c) Give short note on (a) National parks  
(b) Biosphere reserves

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

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:  $(1-x^2)y'' + 2y = 0$ .

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