

B.Tech.

SEM (I) ODD SEMESTER

MAJOR EXAMINATION 2019-2020

## FUNDAMENTALS OF ELECTRONICS ENGINEERING

Time: 3Hrs.

Max. Marks: 50

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

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

- (a) The reverse saturation current of a Si p-n junction diode is  $10\mu A$  at 300K. Determine the forward bias voltage to be applied to obtain diode current of 100mA.
- (b) Classify the materials with help of energy band diagram.
- (c) Write down the constructional difference between Depletion type and Enhancement type MOSFET.
- (d) Differentiate the characteristic of CB, CE, and CC configurations of BJT.
- (e) Define threshold voltage ( $V_T$ ), transconductance ( $g_m$ ) and pinch-off voltage ( $V_P$ ) in the context of FET device.
- (f) The self-bias configuration shown in Fig. 1 has an operating point defined by  $V_{GSQ} = -2.6$  V and  $I_{DQ} = 2.6$  mA, with  $I_{DSS} = 8$  mA and  $V_P = -6$  V. The value of  $g_{ds}$  is given as 20 mS. Determine  $g_m$ ,  $Z_i$ ,  $Z_o$  and  $A_v$ .
- (g) Determine the output waveform for the network of Fig. 2 and calculate the output dc level.

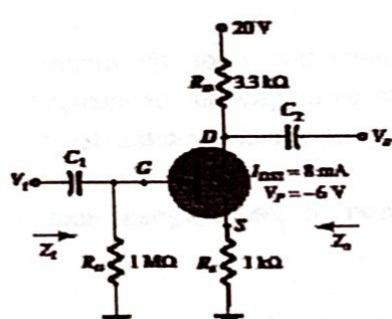


Fig. 1

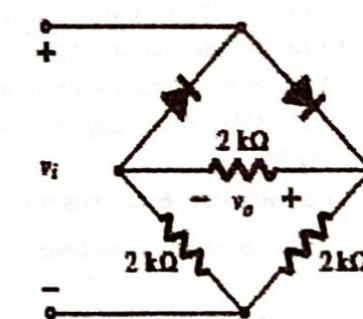
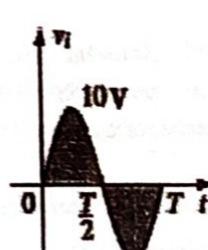


Fig. 2

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

- (a) Reduce the Boolean function using k-map technique and implement using gates  
 $f(w, x, y, z) = \sum m(0, 1, 4, 8, 9, 10)$  which has don't care condition  $d(w, x, y, z) = \sum m(2, 11)$
- (b) Convert the following  $(562.13)_7 = (?)_{10}$   $(467.342)_8 = (?)_{10}$

Q.5

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

What are various electrical specifications?

(c) Explain the block diagram of a DMM, how can measure dc and ac signals, and 0.251.

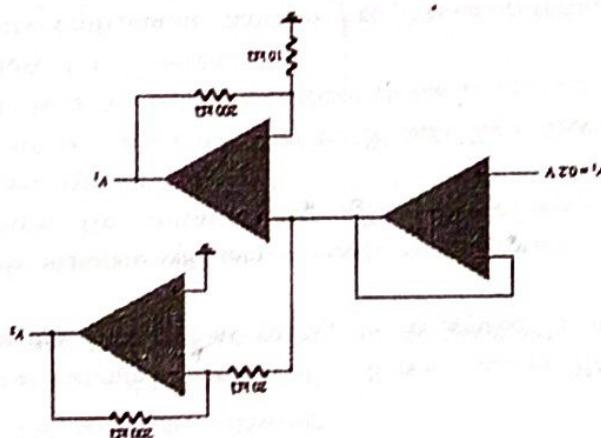
(b) Explain the Ramp type DVM. Calculate the maximum time  $t_1$  for the digital intensity to be controlled? 1.5 MHz. Also suggest a suitable frequency for the ramp generator select ( $t_2 = 1.5 \text{ MHz}$ ). Voltmeter if maximum counting pulses  $N = 1999$  and clock generator frequency

(a) Sketch the neat block diagram of CRT. What is the utility of delay line and trigger circuit. Which part of CRT is known as electrostatic focusing system? How the

(a) Sketch the neat block diagram of CRO. What is the utility of delay line and trigger circuit. Which part of CRT is known as electrostatic focusing system? How the

Q.4

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



(c) Calculate the output voltage  $V_2$  and  $V_3$  in the circuit of figure.

for the output voltage.

(b) Draw the OP-AMP summing amplifier and integrator circuit and obtain expression name all pins.

(a) Enlist the characteristics of an ideal OP-AMP. Draw the PIN diagram of ICL741 and

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

expression  $Y = ABC + BD + E$  using NAND gate only.

(c) Write four advantages of Digital Systems over Analog Systems and implement the

Q.2

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

system waveforms for a digital voltmeter that uses a dual-slope integrator.

(c) Define dual slope-integrator and zero cross detector. Sketch the block diagram and

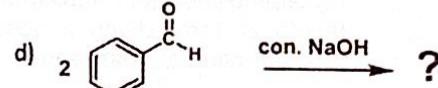
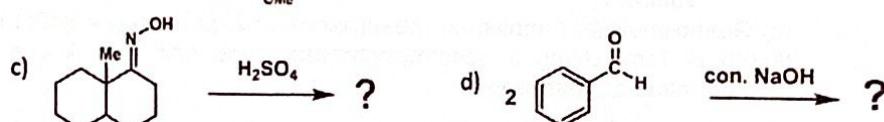
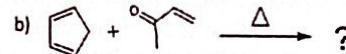
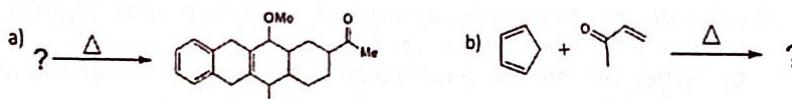
**B.Tech.**  
**ODD SEMESTER**  
**Major Examination 2019-2020**  
**Subject Name: Engineering Chemistry**

**Time: 3 hrs. Max. Marks: 50**

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

**Q 1** Attempt any five of the following.

- (a) What are conductors, semiconductors and insulators? 2
- (b) Draw MO energy level diagram for the CO molecule. What is the order of bond length CO, CO<sup>+</sup>, CO<sup>-</sup>. 2
- (c) Explain the terms: stable equilibrium and metastable equilibrium. 2
- (d) Discuss the different conformations of butane. How will you account for the difference in their relative stability? 2
- (e) (i) Differentiate between bonding and anti-bonding molecular orbitals. 2
- (ii) Mention the rules for LCAO method for the formation of molecular orbitals.
- (f) Complete the following reactions. 2



- (g) Discuss the mechanism of Cannizzaro and Aldol condensation reactions. 2

**Q.2** Attempt any two of the following.

- (a) Discuss the differences between Thermoplastic and Thermosetting polymers. Write a brief note on conducting polymers. 5
- (b) Give the structure and monomer name of the following polymers:  
 i) Nylon-6,6 ii) Terylene iii) SBR iv) Orlon v) PMMA  
 vi) Polystyrene vii) Nylon-6 viii) Polyvinylacetate ix) Polyacrylonitrile x) Polyethyl acrylate 5
- (c) Differentiate between addition polymers and condensation polymers. Starting from phenol, how can nylon-6 be prepared? 0.834 g sample of a solid fuel on complete combustion in the excess of oxygen increased the temperature of water in a bomb calorimeter from 14.36°C to 18.10°C. The mass of water in calorimeter was found to be 1365 g. Calculate the H. C. V and N. C. V. of the fuel; if the water equivalent of calorimeter, etc. is 135 g. 5

**Q. 3** Attempt any two of the following.

- (a) What is Ziegler-Natta catalyst? How will you synthesis Glyptal or Alkyd resin from Phthalic anhydride? Write a mechanism for the polymerization of ethylene in the presence of an organic peroxide as catalyst. 5
- (b) Write notes on:  
 i) Free radical polymerization ii) cationic polymerization iii) Bakelite iv) Synthetic fibers. 5

(c) What are graft and block copolymer? Classify the polymers on the basis of tacticity. A sample of polymer contains: C = 83%, O = 6% and H = 1%. The following data were obtained when the above polymer was tested in a bomb calorimeter:  
 Weight of polymer = 1.84g,  
 Weight of water taken = 1100g  
 Water equivalent of calorimeter = 4,400g  
 Rise in temperature = 4.84°C  
 Calculate the gross and net calorific values of polymer, assuming that the latent heat of condensation of steam is 580 cal/g.

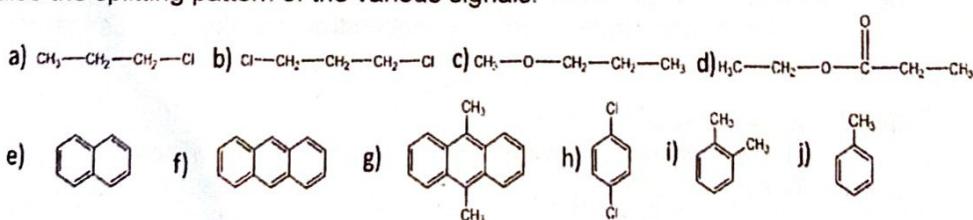
Q. 4 Attempt any two of the following.

- (a) Describe the different molecular vibrations encountered in IR spectroscopy. How would you distinguish between the compounds in each of the following pairs by IR spectral studies?  
 (i) Phenol and Cyclohexanol  
 (ii) Cis and Trans butane  
 (iii) Diethylketone and Ethylamine  
 (iv) Acetaldehyde and Acetone
- (b) (i) The absorbance of  $MgSO_4$  solution containing 0.500 mg Mg/mL was reported as 0.3500 at 440 nm.  
 a) Calculate the specific absorptivity, including units,  $MgSO_4$  on the assumption that a 1.00 cm cuvette was used.  
 b) What will be the absorbance if the solution is diluted to twice its original volume?  
 (ii) Guanosine has a maximum absorbance of 275nm.  $\epsilon_{275} = 8400 M^{-1} cm^{-1}$  and the path length is 1cm. Using a spectrophotometer, you find that  $A_{275} = 0.70$ . What is the concentration of guanosine?
- (c) What is Shielding and Deshielding? Give the structure consistent with the following NMR data:  
 Molecular formula is  $C_{11}H_{16}$   
 i) Singlet at  $\delta = 0.94$ , 9H  
 ii) Singlet at  $\delta = 7.28$ , 5H  
 iii) Singlet at  $\delta = 2.4$ , 2H

Why is mass spectrometry useful? What are the applications of mass spectrometry?

Q. 5 Attempt any two of the following.

- (a) State Zeolite process for the removal of hardness of water. Explain the merits and demerits of lime soda process.
- (b) Give the basic principle of UV spectroscopy. Explain various types of electronic transition. Distinguish between i) 1,3-pentadiene and 1,4-pentadiene ii) ethylene and 1,3-butadiene iii) naphthalene and anthracene by U.V. spectroscopy.
- (c) How many NMR signals do you expect from each of the following compound? Indicate also the splitting pattern of the various signals.



BCS-01

Roll No.	2019011004
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B.Tech/M.Tech/M.Sc. (I<sup>st</sup>Sem)  
ODD SEMESTER  
Minor Test 2019-2020

Introduction to C Programming

Time: 02 Hrs

Max. Marks: 20

Note: Attempt all questions.

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

- What is an operating system? Discuss in brief about different types of operating systems and their services.
- Draw the flow chart for finding the largest element among the three input integers.
- Discuss in brief about the different types of logical operators in C language.
- Write a program in C to test whether the given integer input is even or odd.

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

- Compare between the machine language , assembly language and high level computer languages .
- Explain the following terms in brief :  
(i) Compiler      (ii) Assembler      (iii) Linker      (iv) Loader
- Write an algorithm to find the maximum element in a list of n elements.

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

(a) What will be output of the following programs? Explain your reasoning in brief.

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

ii) void main( )  
{  
    int x = 20;  
    printf("%d", --x + --x + x--);  
    printf("%d", x);  
}

```
iii) void main()
{
    int a = -9, b = 0, c = 1, v;
    v = ((10 && c != 8 || !c) ? (-a>b ? 3:4) : ( b ? 6:8));
    printf("%d", v);
}

iv) void main()
{
    char i = -323;
    printf( "%d\n %c", i, i);
}
```

- (b) Write a program in C that calculates the factorial of a number and keeps on doing it unless a negative number is entered.
- (c) Write a program in C to test whether a given positive integer is prime or not.

**B.Tech.**  
**ODD SEMESTER**  
**Minor Examination 2019-2020**  
**Subject Name: Environment & Ecology**

Time: 2 hrs.

Note: Attempt all questions.

Max. Marks: 30

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

- (a) What is environment? What are its components? Explain the multidisciplinary nature of environmental studies? (4)
- (b) Differentiate between flood and drought? List the effects of water logging? (3)
- (c) Define the terms: (3)
  - i) Producer
  - ii) Consumer
  - iii) Decomposer
- (d) What is IUCN? What is IUCN Red List? (3)

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

- (a) What are causes of deforestation? Suggest some steps to conserve forest? (4)
- (b) Give a brief outline about the mineral reserves of India? What are the impacts of over exploitation of mineral resources? (3)
- (c) What are harmful impacts of modern methods of agriculture? (3)
- (d) Differentiate between renewable and non-renewable sources of energy? (3)

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

- (a) Write short notes on Ecological succession? (4)
- (b) Define the following terms: (3)
  - i) Grassland ecosystem.
  - ii) Food web
  - iii) Ecological pyramid
- (c) What is biogeographic classification of India? (3)
- (d) Write short note on conservation of biodiversity? (3)

BAS-02

Roll No. 2019011004

B.Tech-I ( All Branches)  
ODD SEMESTER  
MINOR TEST (EXAMINATION) 2019 -2020  
( All Branches)  
Engineering Physics-I

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) State the fundamental postulates of special theory of relativity. Deduce the Lorentz Transformation equations. 4
- (b) What is the length of a meter stick moving parallel to its length when its mass is 3/2 times its rest mass? 2
- (c) Show that the mass of a body depends on its velocity. Deduce an expression for the variation of mass with velocity. 2
- (d) The Mass of a moving electron is 11 times its mass. Find its Kinetic energy and momentum. 2
- Q.2 Attempt any Two parts of the following. Q. 2(a) is compulsory.**
- (a) Explain the Phase velocity and the group velocity and show that
- (i) For a wave packet  $v_p v_g = c^2$  4
  - (ii) Group velocity = Particle velocity ( $v_{particle} = v_g$ )
- (b) If the radius of the first Bohr orbit for hydrogen atom is  $0.5 \text{ A}^0$ , then find the velocity of electron in that orbit using the de Broglie theory. (Given that  $\hbar = 6.6 \times 10^{-34} \text{ Js}$  and  $m = 9.1 \times 10^{-31} \text{ Kg.}$ ) 2
- (c) Deduce the relativistic velocity addition theorem. Show that it is consistent with Einstein's second postulate. 2
- Q.3 Attempt any Two parts of the following. Q. 3(a) is compulsory.**
- (a) What was the objective of Davisson-Germer experiment? Discuss the results of this experiment. 4
- (b) Explain Physical Significance of wave function ( $\psi$ ). Also derive time-independent Schrödinger wave equation 2
- (c) Find the probabilities of finding a particle trapped in a box of length L in the region from  $0.45L$  to  $0.55L$  for the ground state and the first excited state. 2

Rank zero et al

But order ~~et al~~

Printed Pages: 2

BAS - 01

Roll No. 2019011004

Name of the Course: B. Tech-I year

Odd Semester

Minor Examination: 2019-20

Subject Name: Engineering Mathematics -I

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)

(i) If  $u = \frac{1}{r}$  and  $r^2 = (x-a)^2 + (y-b)^2 + (z-c)^2$ , prove that

4

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0.$$

(ii) find the  $n^{\text{th}}$  order derivatives of the function

$$f(x) = \frac{x^2}{x^2 + a^2}.$$

Rank

(b) Define the rank of a matrix properly and normal form of a matrix. Also find the rank of given matrix by normal form-

$$\begin{bmatrix} 2 & 4 & 3 & -2 \\ -3 & -2 & -1 & 4 \\ 6 & -1 & 7 & 2 \end{bmatrix}$$

(c)

If  $u = \sin^{-1} \left( \frac{x^4 - y^4}{x-y} \right) + \left( \frac{x^2 + y^2}{x-y} \right)$ , then evaluate

3

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial y \partial x} + y^2 \frac{\partial^2 u}{\partial y^2}.$$

(d) Prove that  $u, v, w$  are dependent or not. If they are dependent, find the relation between them

$$u = \frac{3x^2}{2(y+z)}, v = \frac{2(y+z)}{3(x-y)^2}, w = \frac{x-y}{x}.$$

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

(a) If  $x = \cos h \left[ \left( \frac{1}{m} \right) \log y \right]$  Prove that

$$(i) (x^2 - 1)y_2 + xy_1 = m^2 y$$

$$(ii) (x^2 - 1)y_{n+2} + (2n+1)x y_{n+1} + (n^2 - m^2)y_n = 0.$$

If possible find  $(y_n)_0$ .

$$y_1 = (m \cosh) e^{\frac{m}{\cosh} n}$$

$$y_2 = (m \cosh)^2$$

$$u = \cosh \cdot \frac{1}{m} \log y$$

$$m u = \log y$$

Cosh

$$e^{\frac{m}{\cosh} n} = y$$

$$y = e^{\frac{m}{\cosh} n}$$

$$y_n = (m \cosh)^n e^{\frac{m}{\cosh} n}$$

$$v = f(u, v, w) \quad u = 2x - 3y \\ v = 3y - 4z \quad w = 4z - 2x \\ \underline{\underline{v}} \frac{\partial v}{\partial x} = \frac{\partial v}{\partial u} \cdot \frac{\partial u}{\partial x} \quad w = f(u, v, w)$$

- (b) If  $V = f(2x - 3y, 3y - 4z, 4z - 2x)$ , compute the value of  $6V_x + 4V_y + 3V_z$ . 3
- (c) Examine  $f(x, y) = x^3 + y^3 - 3axy$  for maxima and minimum values. 3
- (d) Find the expansion of the function  $f(x, y) = e^x \log(1+y)$  in a Taylor's series in the neighborhood of the point  $(1, 2)$  upto third degree term 3

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

- (a) Find the rank of the following matrices by converting triangular form or row echelon form, where 4

$$\begin{bmatrix} 1 & 2 & -1 & 3 \\ 4 & 1 & 2 & 1 \\ 3 & -1 & 1 & 2 \\ 1 & 2 & 0 & 1 \end{bmatrix} \quad \text{Rank } \leq 4$$

- (b) Find the inverse of the following matrix by applying elementary operations 3

$$\begin{bmatrix} 2 & 1 & -1 & 2 \\ 1 & 3 & 2 & -3 \\ -1 & 2 & 1 & -1 \\ 2 & -3 & -1 & 4 \end{bmatrix}$$

- (c) Find the Eigen values and Eigen vectors of given matrix 3

$$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

- (d) Examine the consistency of the following system of equations and solve them if they are consistent. 3

$$\begin{aligned} x+2y-z &= 3 \\ 3x-y+2z &= 1 \\ 2x-2y+3z &= 2 \\ x-y+z &= -1 \end{aligned}$$

$$\left[ \begin{array}{ccc|c} 2-\lambda & -1 & 1 & 3 \\ -1 & 2-\lambda & -1 & 1 \\ 1 & -1 & 2-\lambda & 2 \end{array} \right] \quad x=0$$

$$\left[ \begin{array}{ccc|c} 2-\lambda & -1 & 1 & 3 \\ -1 & 2-\lambda & -1 & 1 \\ 1 & -1 & 2-\lambda & 2 \end{array} \right] \quad \lambda = 0$$

$$(2-\lambda)[(2-\lambda)^2 + 1] - 1[-1 + (2-\lambda)]$$

$$\left[ \begin{array}{cccc} 1 & 2 & -1 & 3 \\ 4 & 1 & 2 & 1 \\ 3 & -1 & 1 & 2 \\ 1 & 2 & 0 & 1 \end{array} \right] \quad R_2 \rightarrow R_2 - 4R_1$$

$$R_3 \rightarrow R_3 - 3R_1$$

$$R_4 \rightarrow R_4 - R_1$$

$$\left[ \begin{array}{cccc} 1 & 2 & -1 & 3 \\ 0 & -7 & 6 & -11 \\ 0 & -7 & 4 & -7 \\ 0 & 1 & -3 \end{array} \right] \quad R_3 \rightarrow R_3 - R_2$$

$$R_3 \rightarrow R_3 - R_2$$

$$\left[ \begin{array}{cccc} 1 & 2 & -1 & 3 \\ 0 & -7 & 6 & -11 \\ 0 & 0 & -2 & 4 \\ 0 & 0 & 1 & -3 \end{array} \right] \quad R_3 \rightarrow R_3/2$$

$$R_3 \rightarrow R_3/2$$

$$\left[ \begin{array}{cccc} 1 & 2 & -1 & 3 \\ 0 & -7 & 6 & -11 \\ 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & -1 \end{array} \right]$$

$$\left[ \begin{array}{cccc} 1 & 2 & -1 & 3 \\ 0 & -7 & 6 & -11 \\ 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & -1 \end{array} \right]$$

Subject Code	BAS : 03
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Roll No.	2019014006
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**B. TECH. (SEMESTER I) ODD SEMESTER**

**MINOR EXAMINATION 2019-20**

**PROFESSIONAL COMMUNICATION**

Time- 2 hr.

**Max. Marks-30**

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

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

(a) Describe the various levels of communication with specific illustrations. 4

(b) Enumerate the elements of communication and their role in the communication process in detail. 3

(c) What are the essential characteristics of a paragraph? Expound all in detail highlighting their importance. 3

(d) Explain deductive 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 the 7 Cs of communication? Explain their role in successful communication. 4

(b) Write an article of role of English language in professional communication enumerating all the features. 3

(c) Defining the barriers of communication expound its varied types. 3

(d) What is Technical communication? Differentiate it from general communication comparing all aspects. 3

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

(a) Answer the following: 4

i. One word substitution-

- a) one who hates mankind                          b) strange in appearance

ii. Give antonyms-

- a) Warrant                          b) Precarious

iii. Synonym of-

- a) Vigilance                          b) Diligent

iv. Offer correct meanings-

- a) Barren, Baron                          b) Ascent, Assent

**b) Do as directed-**

3

**i. Fill in the suitable preposition-**

- a) A child was run over .....the bus. (with /through/ by)
- b) As the first president of India Dr Rajendra Prasad was known ..... the people across the world.(by/of/to)

**ii. Add proper conjunctions-**

a).....he is weak, he works hard.

b).....does he come here..... does he contact anyone.

**iii. Correct the sentences-**

a) She does not know to swim moreover she love swimming.

b) We demonstrated to them how we were prepared.

(c) Mark out the difference between periodic and loose sentence with two examples of each.

3

(d) Write a précis for the given paragraph.

3

Science on physical plane has served so much to knit the globe with linked thread onto materialistic plane of oneness. Through technology and scientific advancements the farthest corners of the world are united; within a fraction of second by means of media and internet mass of people connect to each other. The physical spectrum has been broadened by science, though the psyche is not evolved to direct and administer the materialistic advancement towards a balanced growth and perfection in existence. So the progression of human society is lame and one eyed that creates more challenging circumstances. The race in physical advancement has lost the power to comprehend the truths of existence and universal movements. By creating materialistic non-living mechanism man has mistakenly understood oneself the master, he seems to forget the divine laws that creates and controls the universe. It is a well-known fact that science is a good servant but a bad master. Science is outcome of sensory perception and when man falls to be the pray of senses, the inclusive destruction is seen. All fatal desires overpower man's heart that takes up to physical, moral, ethical, social and nature's demolition. The materialistic advancement/ science is a boon till it is rightly used as an instrument in man's life goal, but when turns to be the object of life, it creates a huge chaos. Like the warning bells, the calamities are reminding the egoistic human generation to rethink and resolve the actions against nature's law, now it is the time to stop, return and remove the cover from intellect to realize the self and to form a consolidated whole. Everything depends upon one's mind. Devoid of mind stability in higher rages it is impossible for a man to liberate himself from the ever encroaching clutches of ignorance created illusion of reality. The sufferings of life could be eliminated by performing spiritual austerities that the path-pavers exercised to the utmost extent and gave the results thereof for the redemption of mankind.

Name of the Course: B. Tech-I year

Odd Semester

Minor Examination: 2019-20

Subject Name: Engineering Mathematics -I

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) (i) If  $u = \frac{1}{r}$  and  $r^2 = (x-a)^2 + (y-b)^2 + (z-c)^2$ , prove that

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0.$$

- (ii) find the  $n^{\text{th}}$  order derivatives of the function

$$f(x) = \frac{x^2}{x^2 + a^2}.$$

- (b) Define the rank of a matrix properly and normal form of a matrix. Also find the rank of given matrix by normal form-

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$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial y \partial x} + y^2 \frac{\partial^2 u}{\partial y^2}.$$

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- (a) If  $x = \cos h \left[ \left( \frac{1}{m} \right) \log y \right]$  Prove that

$$(i) (x^2 - 1)y_2 + xy_1 = m^2 y$$

$$(ii) (x^2 - 1)y_{n+2} + (2n+1)x y_{n+1} + (n^2 - m^2)y_n = 0.$$

If possible find  $(y_n)_0$ .

4

- (b) If  $V = f(2x - 3y, 3y - 4z, 4z - 2x)$ , compute the value of  $6V_x + 4V_y + 3V_z$ . 3
- (c) Examine  $f(x, y) = x^3 + y^3 - 3axy$  for maxima and minimum values. 3
- (d) Find the expansion of the function  $f(x, y) = e^x \log(1+y)$  in a Taylor's series in the neighborhood of the point  $(1, 2)$  upto third degree term 3

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

- (a) Find the rank of the following matrices by converting triangular form or row echelon form, where 4

$$\left[ \begin{array}{cccc} 1 & 2 & -1 & 3 \\ 4 & 1 & 2 & 1 \\ 3 & -1 & 1 & 2 \\ 1 & 2 & 0 & 1 \end{array} \right]$$

- (b) Find the inverse of the following matrix by applying elementary operations 3

$$\left[ \begin{array}{cccc} 2 & 1 & -1 & 2 \\ 1 & 3 & 2 & -3 \\ -1 & 2 & 1 & -1 \\ 2 & -3 & -1 & 4 \end{array} \right]$$

- (c) Find the Eigen values and Eigen vectors of given matrix 3

$$\left[ \begin{array}{ccc} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{array} \right]$$

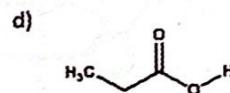
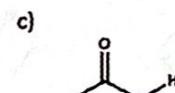
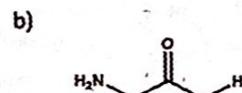
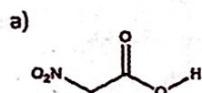
- (d) Examine the consistency of the following system of equations and solve them if they are consistent- 3

$$\begin{aligned} x+2y-z &= 3 \\ 3x-y+2z &= 1 \\ 2x-2y+3z &= 2 \\ x-y+z &= -1 \end{aligned}$$

**B.Tech.-I Year  
ODD SEMESTER  
Minor Examination 2019-2020  
Subject Name: Engineering Chemistry**

**Time: 2 hrs.****Max. Marks: 20****Note: Attempt all questions.****Q.1 Attempt any three of the following. Q. 1(a) is compulsory.**

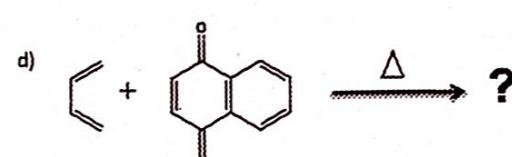
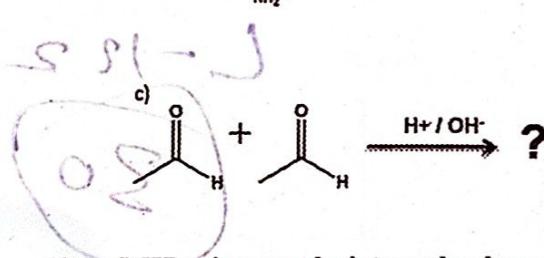
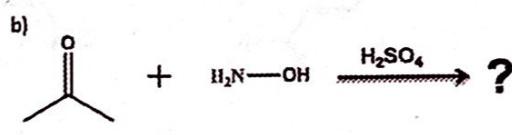
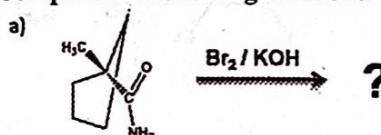
- (a) i) What is inductive effect? Explain the at least five applications of inductive effect. (4)  
 ii) Arrange the following compounds in increasing order of acidity and explain.



- (b) With the help of Molecular orbital diagram arrange the following species in order of their bond length, and bond order. Also write their magnetic character. (2)



- (c) Complete the following reactions. (2)



- (d) i) What is meant by intermolecular and intramolecular H-bonding? (2)  
 ii) Why ortho-nitrophenol is more volatile than para-nitrophenol? Explain.

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

- (a) Define and explain the terms involved in phase rule. Draw and Explain neat labeled phase diagram for water system. (4)

- (b) What is liquid crystal? Differentiate between nematic and smectic liquid crystals? Write at least four applications of liquid crystals. (2)

- (c) Describe the structure and application of graphite. How it acts as conductor of electricity? (2)

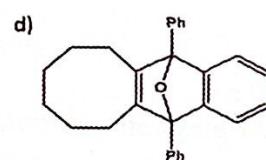
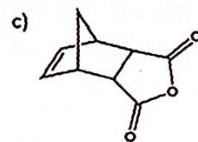
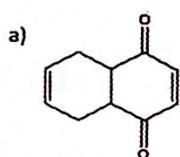
**Q. 3 Attempt any two of the following. Q. 3(a) is compulsory.**

- (a) i) What is Aldol condensation? Discuss the mechanism of the reaction. (4)

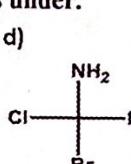
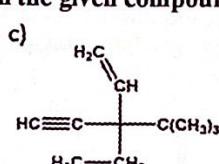
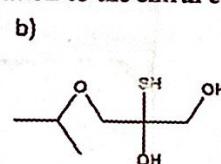
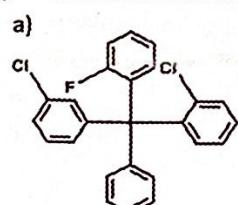
- ii) Explain E1 and E2 reactions with suitable examples and discuss its mechanism.

- (b) i) From what reactants could each of the following compounds be synthesized?

(2)

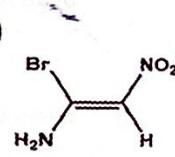
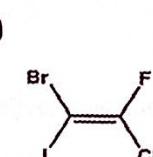
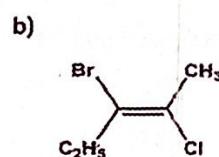
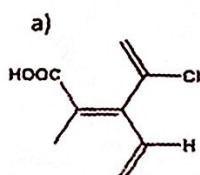


- (c) ii) Discuss the mechanism of  $\text{S}^{\text{N}}\text{2}$  reaction.  
 i) Allocate R and S configuration to the chiral carbons in the given compounds as under.



(2)

- ii) Allocate the symbol E or Z to each of the following compounds and explain.



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B.Tech.(Civil engineering)  
 ODD SEMESTER  
 Minor Examination 2019-20  
 Engineering Mechanics

Time: 2Hrs

Max Marks: 20

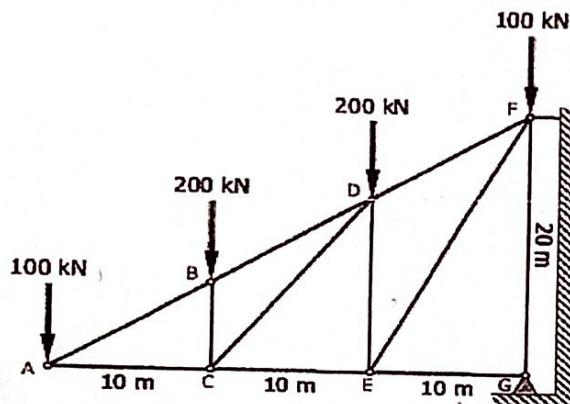
Note: Answer all questions

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

- a) State and prove Varignon's theorem of moments. 4
- b) Explain principle of transmissibility of forces. 2
- c) Differentiate between centroid and centre of gravity. 2
- d) Explain the terms coefficient of friction and angle of repose. 2

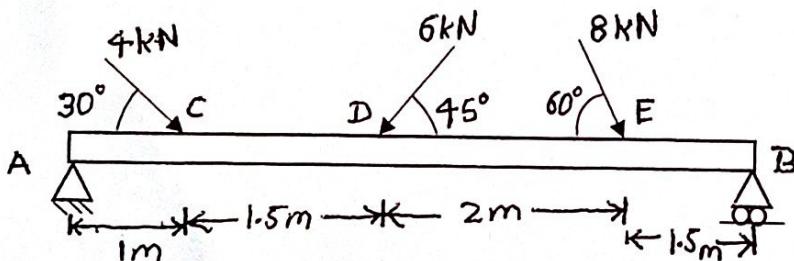
Q.2 Attempt any two parts of the following and Q.2(a) is compulsory.

- a) Use the method of sections to compute the magnitude and nature of force in members DF, EF, and EG of the cantilever truss shown below:



4

- b) List the assumptions made in the analysis of truss. 2
- c) A beam AB of span 6m is hinged at A and supported on rollers at the end B carries load as shown in fig below. Determine the reactions at A and B



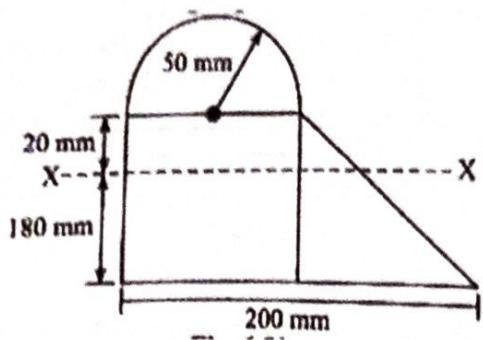
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Q.3 Attempt any two parts of the following and Q.3(a) is compulsory

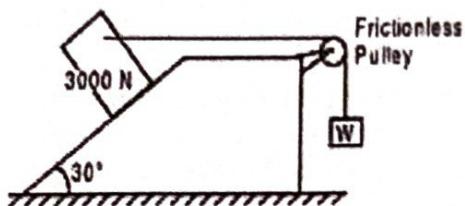
- a) Determine the area moment of inertia of the built-up section about the centroidal axis: 4

*s<sup>16</sup> s<sup>16</sup> s<sup>16</sup> s<sup>16</sup>*

(Cont...)

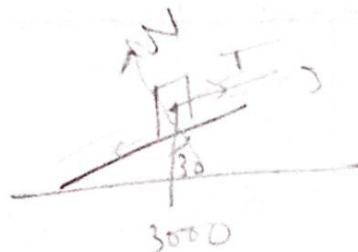


- b) A 3000 N block is placed on an inclined plane as shown in Fig. below. Find the maximum value of  $W$  for equilibrium if tipping does not occur. Assume coefficient of friction as 0.2. (2)



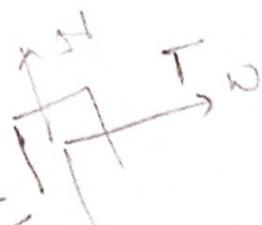
- c) State Coulombs law of solid friction.

2



$$N = 3000$$

$$T = \boxed{T = W}$$



$$F = 3000 \sin 30^\circ \quad 3000 \cos 30^\circ$$

$$W = M_2 N + 3000 \sin 30^\circ$$

$$W = 3000 \sin 30^\circ + 3000 \cos 30^\circ \cdot \frac{1}{2} = 3000 \sqrt{3}/2$$

$$= 3000 \left( \frac{\sqrt{3}}{2} + 1 \right) \quad N = 1500 \sqrt{3}$$

$$1500 \sqrt{3} \cdot 0.2 \cdot 1.3 = 1300$$