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B.TECH
(SEM II) THEORY EXAMINATION 2017-18
ENGINEERING CHEMISTRY

Time: 3 Hours   *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   2 x 7 = 14

   a.   Calculate the bond order of N_2^+.
   b.   Graphite is a good conductor of electricity. Why?
   c.   What do you understand by the term functionality of a polymer? Explain by taking an example.
   d.   Give reactions of lead-acid storage cell when it behaves like a galvanic cell.
   e.   Explain why a pure metal rod half immersed vertically in water starts corroding at the bottom?
   f.   What is calgon conditioning? Explain.
   g.   A sample of coal contains 60% Carbon, 33% Oxygen, 6.0% Hydrogen, 0.5% Sulphur, 0.2% Nitrogen and 0.3% Ash. Calculate GCV and NCV of coal.

SECTION B

2.   **Attempt any *three* of the following:**   7 x 3 = 21

   a.   Explain Molecular Orbital Theory in case of metals and on its basis differentiate between conductors, semiconductors and insulators.
   b.   (i) Give preparation, properties and applications of BUNA N and Terylene.
        (ii) Explain intrinsically conducting polymers.
   c.   (i) Give the construction and working of Galvanic cell.
        (ii) Explain the different mechanisms of lubrication.
   d.   (i) A sample of water contains the following impurities:
        Ca^{2+} = 20ppm, Mg^{2+} = 18 ppm, HCO_3^- = 183 ppm and SO_4^{2-} =24ppm. Calculate the lime and soda needed for softening.
        (ii) Discuss the application of phase rule to water system.
   e.   (i) Calculate the minimum weight of air required for complete combustion of 1kg of fuel containing C = 90%, H = 3.5%, O = 3.0%, S = 0.5%, H_2O = 1%, N = 0.5% and ash = rest.
        (ii) Give the composition of biogas. With the help of diagram, explain a biogas plant.

SECTION C

3.   **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   (i) Explain Schottky and Frenkel defects in crystals.
         (ii) Give the properties and applications of fullerenes.
   (b)   (i) Explain why O_2 is paramagnetic in nature.
         (ii) Give the applications of nanomaterials in electronics and medicine.

4.   **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   What are Grignard reagents? How are they prepared? Give its applications.
   (b)   What are composite materials? Give the classification of composite materials.

5. **Attempt any *one* part of the following:** 7 x 1 = 7   3

   (a) Discuss the electrochemical theory of corrosion along with equations. Explain why sheets of Zinc metal are hung around the ship hull of ocean going ships.

   (b) Explain the manufacturing process of cement. Give the chemical composition of Portland cement along with its setting and hardening.

6. **Attempt any *one* part of the following:** 7 x 1 = 7

   (a) Explain the Zeolite process of water softening? The hardness of 10,000L of a sample of water was removed by passing it through a zeolite softener. The zeolite softener then required 200 L of NaCl solution containing 150 gm/L of NaCl for regeneration. Find the hardness of water sample.

   (b) Explain the terms phase, components and degree of freedom with examples.

7. **Attempt any *one* part of the following:** 7 x 1 = 7

   (a) Explain the term chemical shift along with shielding and deshielding. An organic compound with molecular formula $C_3H_3Cl_5$ gave the following proton NMR data: (i) A triplet 4.52 δ 1H   (ii) A doublet 6.07 δ 2H

   (b) What do you understand by the terms GCV and NCV? Explain the construction and working of bomb calorimeter.

B. TECH.
(SEM II) THEORY EXAMINATION 2017-18
ELEMENTS OF MECHANICAL ENGINEERING

Time: 3 Hours   **Total Marks: 70**

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt all questions in brief.**   **2 x 7 = 14**

a. State and explain Perpendicular axis theorem.
b. Explain conditions of equilibrium of coplanar concurrent and non-concurrent forces.
c. Differentiate between statically determinate and indeterminate beam.
d. Differentiate between centroid and centre of gravity.
e. Differentiate between Intensive and extensive properties.
f. Describe Clausius inequality.
g. Write down the SFEE for compressor and boiler.

SECTION B

2. **Attempt any three of the following:**   **7 x 3 = 21**

a. State and prove parallel axes theorem also describe radius of gyration.
b. Define truss, types of truss and write down the assumptions taken while analyzing a truss.
c. Sketch the Otto cycle on P-V and T-S diagram and show in the relevant diagram, the heat supplied and work done in various processes. Also derive the efficiency expression
d. Define the following terms: -
   (i) PMM1 and PMM2
   (ii) Pure substance
   (iii) Carnot cycle and Carnot theorem
e. Draw simple Rankine cycle on P-V and T-S diagram. Steam enters at 80 bar and 450°C in a steam turbine and expands isentropically up to condenser pressure of 0.1 bar. Find the stage of steam at turbine exit and power developed by the turbine. If the mass flow rate of steam is 5 kg/s.

SECTION C

3. **Attempt any one part of the following:**   **7 x 1 = 7**

(a) Two smooth spheres **P** and **Q** each of radius 25 cm and weight **500N**, rest in a horizontal channel having vertical walls, the distance between the walls is 90 cm. Find the reactions at the points of contacts **A, B, C** and **D** shown in figure 1.
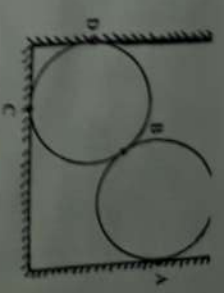
(b) Find the moment of inertia about the axis OX for the lamina as shown in figure.
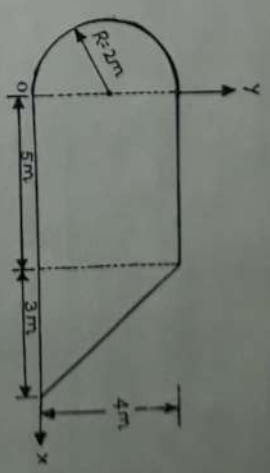
Figure:-1

Figure:-2

4. **Attempt any one part of the following:**   **7 x 1 = 7**

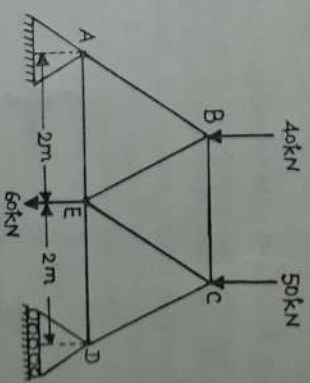(a) Determine the forces in each member of the truss as shown in figure 3.

Figure:-3

(b) Draw SFD and BMD of the beam as shown in figure 4. Also find out the point of contraflexure if any and calculate maximum bending moment.
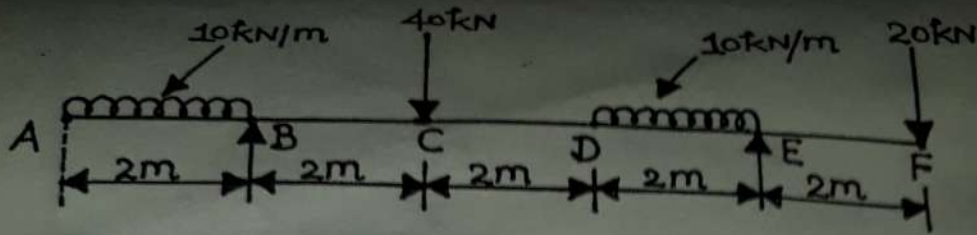
10kN/m   40kN   10kN/m   20kN

A   B   C   D   E   F

2m   2m   2m   2m   2m

Figure:-4

5. **Attempt any *one* part of the following:**   7 x 1 = 7

(a) Define the following term
  (i) Shear modulus
  (ii) Young's modulus
  (iii) Poisson's Ratio
  (iv) Bulk modulus

(b) What is meant by pure bending? List the assumptions made for the theory of pure bending. Also derive bending equation.

6. **Attempt any *one* part of the following:**   7 x 1 = 7

(a) Derive the steady flow energy equation.

(b) A heat engine operating between two reservoirs at 1000 K and 300K is used to drive a heat pump which extracts heat from the reservoir at 300 K at a rate twice that at which the engine rejects heat to it. I f the efficiency of the engine is 40% of the maximum possible and the COP of the heat pump is 50% of the maximum possible, What is the temperature of the reservoir to which the heat pump rejects heat? What is the rate of heat rejection from the heat pump if the rate of heat supply to the heat engine is 50 kW?

7. **Attempt any *one* part of the following:**   7 x 1 = 7

(a) Explain the working of 4 stroke Petrol engine with the help of neat and clean diagrams with proper labeling showing all the major components of engine.

(b) Distinguish between enthalpy and internal energy. Two Carnot engines work in series between the source at temperature 500 K and sink at temperature 300 K. If both develop equal power, determine the intermediate temperature.

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B.TECH
(SEM 2) THEORY EXAMINATION 2017-18
BASIC ELECTRONICS

Time: 3 Hours   **Total Marks: 70**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   Attempt *all* questions in brief.   2 x 7 = 14

A. Derive the relationship between α & β.

B. The reverse saturation current of a Si p-n junction diode is 10μA at 300K.Determine the forward bias voltage to be applied to obtain diode current of 100mA.

C. A Lissajous pattern on an oscilloscope is stationary and has 4 horizontal and 3 vertical tangencies. The horizontal frequency is 50 Hz, find vertical frequency.

D. Explain the principle of operation of LED.

E. Describe how FET can be used as voltage variable resistor?

F. Sketch the circuit of op-amp as an integrator and differentiator.

G. The unmodulated r.m.s current of an AM wave is 8.93A and it increase to 11.25A with modulation. Determine the modulation index.

SECTION B

2.   Attempt any *three* of the following: 7 x 3 = 21

A. Explain the operation of full wave bridge rectifier with the help of a circuit diagram. Also sketch the input and output waveforms. Define its PIV. Also derive its ripple factor and rectification efficiency.

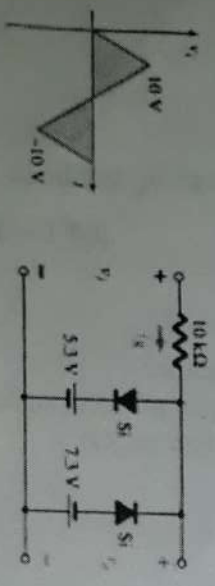B. Define clipper circuit. Sketch the output waveform for the circuit shown below for given input (Fig 1).

Fig. 1

C. Draw the basic structure of CB BJT and explain its principle of operation with in neat diagram along with its input and output characteristics.

D. Explain CRO with the help of diagram. How can we measure phase and frequency using CRO?

E. Define op-amp with the help of block diagram. Also draw its equivalent circuit. List the ideal characteristics of op-amp.

SECTION C

3.   Attempt any *one* part of the following: 7 x 1 = 7

A (i) Find the range of R_L and I_L that will maintain a constant output voltage of 10V (Fig. 2)

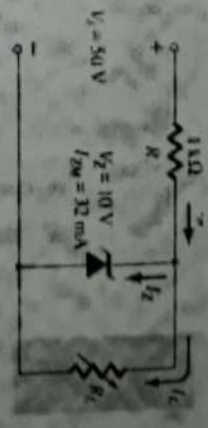(ii) Also determine the maximum wattage rating of the Zener diode for given circuit.

Fig. 2

B. Discuss the construction and working of tunnel diode. Also sketch its I-V characteristics and explain.

4.   Attempt any *one* part of the following: 7 x 1 = 7

A. For the voltage divider network shown below (Fig. 3), Given $I_{DSS}=10mA$, $V_P=3.5$ V, determine V_G, I_{DQ}, V_{GSQ}, V_D, V_S & V_{DSQ}
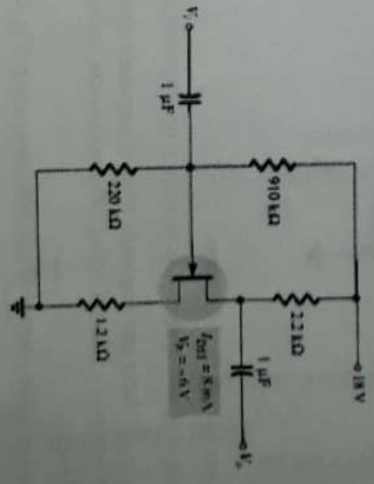
Fig. 3

B. Determine the output waveform for the given network (Fig. 4). Determine the output de level and compute PIV for each diode.
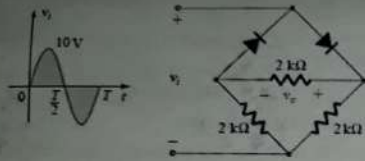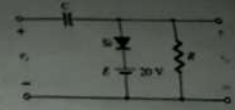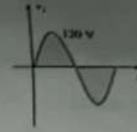

Fig. 4

7

Fig.6

(ii)Sketch v₀ for given circuit configuration (Fig. 7):
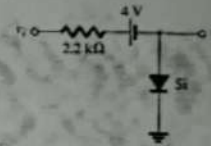

Fig. 7

5. Attempt any *one* part of the following: 7 x 1 = 7

A. Draw the circuit of n-channel depletion type MOSFET & explain its operation. Also draw its drain & transfer characteristics.

B. i. Explain the operation of op-amp as integrator.
   ii Determine the output voltage for given op-amp circuit(Fig. 5).
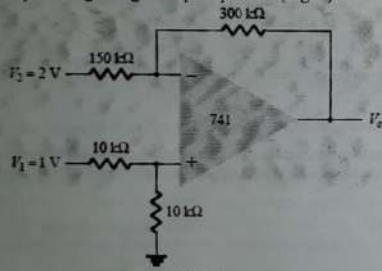
Fig. 5

7. Attempt any *one* part of the following: 7 x 1 = 7

A. Using suitable diagram explain the basic principle of digital multimeter (DMM).Also list its applications.

B. (i) Explain Double Sideband Suppressed Carrier (DSB- SC) Techniques.

   (ii)Compare Amplitude Modulation (AM), Frequency Modulation (FM) and Phase Modulation (PM).

6. Attempt any *one* part of the following: 7 x 1 = 7

A. (i) Define Amplitude Modulation. Derive an expression for amplitude modulated wave.

   (ii)A sinusoidal carrier of 1MHz and amplitude 100V is amplitude modulated by a sinusoidal modulating signal of frequency 5 KHz providing 50% modulation. Calculate the frequency and amplitude of USB and LSB.

B. (i) Sketch the output for given clamper circuit with shown input (Fig. 6).

B.Tech.
(SEM-II) THEORY EXAMINATION 2017-18
COMPUTER SYSTEM & PROGRAMMING IN C

Time: 3 Hours   *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   2 x 7 = 14

a. What is token in 'C' language?
b. What do you mean by formatted output in C language? Explain with example.
c. What is the use of **fseek( )** function in files. Write its syntax?
d. Write down the output of the following.

```
main()
{
        int i=1;
        for( ; ; )
        {
        printf("%d",i);
        if(i= =7)
        break;
        }
}
```

e. Explain function prototype? Why is it required?
f. What are subscripts? How are they specified?
g. Write the use of putchar() and getchar().

SECTION B

2.   **Attempt any *three* of the following:**   7 x 3 = 21

a.   Write a program in C to find the largest number of elements in 4*4 matrix.
b.   Explain the syntax and use of the following directives with examples:
    (i) #ifdef   (ii) #undef
    (iii)#pragma   (iv) #include
c.   Write short note on:
    (a) Top down program development approach.
    (b) Differentiate Structure and Array.
d.   A Write a Recursive program in "C" language to print Fibonacci series.
e.   What is algorithm? What are the main steps followed in the development of an algorithm? Write an algorithm for sum of digits in a given number.

SECTION C

3.   **Attempt any *one* part of the following:**   7 x 1 = 7

(a)   Describe Compiler, interpreter, assembler? Write the names of compiler that are used in c programming.
(b)   Convert the following:

        (i) $(0110110.1100)_2$ $= ()_8$

(ii) $(74.67)_{10}$ = $()_{16}$

(iii) $(AB.CD)_{16}$ = $()_8$

(iv) $(EFE.45)_{16}$ = $()_2$

(v) $(576.4)_{10}$ = $()_6$

(vi) $(1234.7)_8$ = $()_{16}$

(vii) $(334.43)_8$ = $()_2$

4. **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   Explain different bitwise operators available in C with examples.

   (b)   What is meant by type conversion? Why is necessary? Explain about implicit and explicit type conversion with examples.

5. **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   Write a program to find the Armstrong number from 1 to 100.

   (b)   Write a program to generate a following numbers structure:

        12345
        1234
        123
        12

6. **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   Write a program to add two matrices of dimension 3*3 and store the result i another matrix.

   (b)   Write a program in C to create a database of fifty students to store person details such as roll no, name and marks. Print all the details of student whos name is entered by user.

7. **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   Write a program in C to reverse a string by using pointer.

   (b)   Explain the following functions in file operations

        (i) getw( ) (ii) putw() (iii) fscanf( ) (iv) fprintf( )

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B. Tech
Even Semester Theory Examination 2017-18
Professional Communication

Time:3 Hours   *Total Marks:70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1-Attempt all questions in brief.   2x7=14

 a.   Distinguish between interpersonal and mass communication.
 b.   What do you mean by impromptu speech?
 c.   Explain how language is an encoding and decoding device?
 d.   Define deductive method of paragraph writing.
 e.   What is the role of philosophy in integrating the scientific findings?
 f.   Find out the root word in the following-
      i-Overborrowing   ii- Nonsense   iii- Mismanagement iv- Photography
 g.   Define syllable with example.

SECTION B

2. Attempt any three of the following: 3x7=21

 a-   Describe different levels of communication.
 b-   What are the requisites for effective sentence construction? Describe in detail.
 c-   What are the broader guidelines for drafting a letter of claim or complaint? Goodluck
      Electronics ordered for thirty Air- Conditioners to ABC Company ltd. But on arrival of the
      consignment, the purchase manager found complaints in at least twelve of them. As purchase
      manager of Goodluck Electronics write a complaint letter to manager ABC Company ltd,
      suggesting the adjustment you seek.
 d-   What is Kinesics? Describe all its components.
 e-   How is question of a machine or a self, crucial to an enquiry into the identity of man? Pin point
      briefly apropos of J. Bronowski's views.

SECTION C

Attempt all parts: 5x7=35

3. Attempt any one part of the following:
   a.   Bring out difference between Technical and General Communication.
   b.   Describe formal and informal channels of communication flow with examples?

4. Attempt any one part of the following:
   a.   What is word formation? Describe rules for framing new words.
   b.   1. Choose the correct nouns to make the following sentences grammatically correct: (2)
            i.Have you got all the informations/ information?
            ii.On my way back I bought four dozen/ dozens bananas.
            iii.In Shakespearean world even the handkerchiefs/ handkerchieves can spell a tragedy.
            iv.Her sister-in-laws/ sisters-in-law made her life miserable.

                                                                                          (2)
        2. Fill in the blanks with suitable modal verbs-
            i.   You _____ stop when the traffic lights are red.
            ii.   You mind if I borrowed your car.

3. Transform the following sentences as directed-
  i.   We are too thrilled to express it in words. (Negative)
  ii. Vivekanand was one of the most popular Indian saints. (Positive degree)

4. Fill in the blanks with suitable articles wherever required-
  i.   He thinks that_____ love is what will save us all.
  ii. Do you want to go to_____ restaurant where we first met?

5. Attempt any one part of the following:

  a. You are the admission in- charge of Arihant Group of Institutions. Write a report to be submitted to the chairman of the group regarding downfall in admission.
  b. Resume is the stepping stone to enter in the professional world. Make your own resume including all the necessary details of your achievements.

6. Attempt any one part of the following:

  a. What do you mean by Attitude? What are the ways to improve one's Attitude?
  b. What is paralanguage? Does silence also fall under the umbrella of paralanguage?

7. Attempt any one part of the following:

  a. Discuss briefly how Philosophy functions as a comprehensive science?
  b. Even though Science and Literature differ from each other in their preparation and approach, they have something in common. Where does the similarity lie?