

**Hum 1215**  
**Technical English**

**Time: 3 Hours**

**Full Marks: 210**

- N.B.** i) Answer **any THREE** questions from each section in separate scripts  
ii) Figures in the right margin indicate full marks.

**Section A**

(Answer **ANY THREE** questions from this section in Script A)

1. a) Make sentences on the following structures using the verbs given in brackets. (14)
- i) Subject + Intransitive verb + adverbial of place. (stand as verb)
  - ii) Subj. + Linking verb + adj. complement (sound as verb)
  - iii) Subj. + Linking verb + noun complement (appear as verb)
  - iv) Subj. + Transitive verb + infinitive as object (promise as verb)
  - v) Subj. + Transitive verb + obj. + adj. complement (render as verb)
  - vi) Subj. + Transitive verb + obj. + noun complement (label as verb)
  - vii) Subj. + Transitive verb + obj. + obj. (wish as verb)
- b) Make sentences using the following Modals as directed. (12)
- i) Could (To express polite request)
  - ii) Must (To express logical deduction)
  - iii) Would rather (To express preference)
  - iv) Need (To express unnecessary action in the past)
  - v) Be to (To express command)
  - vi) Be going to (To express intention)
- c) Make sentences using the following phrases and idioms. (09)  
A piece of cake; Kangaroo court; Tip of the iceberg; A can of worms; When it rains it pours; White lie.
2. a) Frame wh questions from the underlined parts of the following answers. (14)
- i) A lion was very proud for his strength.
  - ii) I got down from a train at Khulna station.
  - iii) She talked gaily.
  - iv) I heard the girl singing.
  - v) He graduated in 2018.
  - vi) I saw my friend off at the airport.
  - vii) He has been reading for two hours.
- b) Make sentences using the following words as directed. (12)  
Phone (as verb); Phone (as adjective); Back (as adverb); Say (as noun); Walk (as noun); Walk (as adjective).
- c) Change the following words as directed and make sentences with the changed words. (09)  
Food (into verb); Imagine (into adjective); Alternation (into verb); Order (into adjective); Mock (into noun); Originate (into adverb).
3. a) Transform the following sentences as directed. (14)
- i) Every mother loves her child. (Negative)
  - ii) I shall never forget you. (Affirmative)
  - iii) No one can act like this. (Interrogative)
  - iv) She called him but he did not respond. (Simple)
  - v) We listened to understand. (Complex)
  - vi) He is hungrier than I thought. (Positive)
  - vii) A promise should be kept. (Active)
- b) Rewrite the following sentences using the right form of verbs. (12)
- i) Sixty cents of it (be) in pennies.
  - ii) Hardly he (reach) the station when the train left.
  - iii) Would you mind (sing) a song?
  - iv) He just (leave) the room.
  - v) It is long since I (see) her last.
  - vi) It (rain) since morning.
- c) Make a new word with each of the following prefixes and suffixes and use them in sentences. (09)  
De....., For....., Se....., .....age, .....en, .....mit.

4. a) Complete the sentences with subordinate clauses as directed.
- .....surprised us. (noun clause)
  - He strongly disapproved of..... (noun clause)
  - Democracy is a notion..... (adjective clause)
  - This is the house in ..... (adjective clause)
  - The doctor always comes..... (adverb clause of time)
  - They said they did it..... (adverb clause of purpose)
  - ....., I still could not blame him. (adverb clause of concession)
- b) Frame sentences expressing the following notions/emotions. (12)  
 i) Apology, ii) Proposal, iii) Regret, iv) Confusion, v) Creepy, vi) Revolt.
- c) Fill in the blanks with suitable words: (09)
- I told my mom, "I am ready to do anything in the kitchen except \_\_\_\_\_ the floor".
  - It is easy to smile as \_\_\_\_\_.
  - What an antibiotic does is \_\_\_\_\_ the pace of killing the infecting bacteria.
  - Because of his \_\_\_\_\_ habit, he could not save much money.
  - Speeding and blocking are traffic offences which lead to \_\_\_\_\_ accidents.
  - Creative people are often \_\_\_\_\_ with their own uniqueness.

### Section B

(Answer ANY THREE questions from this section in Script B)

5. a) Read the passage and answer the questions: (20)
- Many young adults who have been teased for their looks are now applying to have their problem areas "fixed" by LBFF, a non-profit organization. Nadia, a 20 years old, received great attention when she underwent three different radical facial plastic surgery procedures after being bullied for years about her looks. Nadia admitted that university used to be a nightmare because she was constantly taunted about her appearance. Even though, she tried to act like she didn't care, those comments hurt her a lot. She even contemplated suicide and made excuses so that she wouldn't have to go to classes. When her mother found out about the bullying, she took Nadia to LBFF. The LBFF accepted Nadia's application as soon as they saw her picture. Dr. Romo said that beside her ear pinned back Nadia also needed a chip implant to balance her face and a nose job to fix a deviated septum. In total she received 40,000 worth of surgery for free. The surgeries were very painful for Nadia and it took months for her swollen face to heal, but she did manage to return to school with a new face to show off, a face she was finally proud of!
- Nadia's procedure may have helped her overcome her emotional trauma, but experts warn that if the deformities are not really a problem to a person, plastic surgery is not the answer! In fact, when a teen or young adult decides to get plastic surgery because he/she is being bullied, it can send the wrong message. By surgically altering the victim of a bully, it is as if you justify the bully and agree that the victim is in fact worth of all those names he/she has been called over. It is like saying to teenagers: "Yes, there is something wrong with you, and you should get it fixed!"
- After her surgeries, Nadia became the talk of the town, she gave a lot of interviews and received great attention from the media. She even bought new clothes and started wearing makeup. While she is thrilled with her new look, Nadia and her mother acknowledged that getting plastic surgery was an extreme approach to stop the bullying.
- Should teens or young adults go to the extremes just because they are being bullied? Why / why not?
  - It people chose to go under surgery; is bullying only skin deep? Given reasons for your answer.
  - Why did the experts warn that surgically altering can send the wrong message?
  - What did Nadia confess to the media?
- b) Write a précis of the above passage with a suitable title. (15)
6. a) Write a cause and effect paragraph on enforced disappearance. (15)  
 b) Amplify the idea contained in the statement: (20)  
 What doesn't kill you makes you stronger.
7. a) Southwest Asia Limited is looking for a Biomedical Service Engineer in multifaceted hospital based employment. Prepare your CV and apply for the post. (20)  
 b) Suppose it came to your attention that many employees are inappropriately using their work hours on Google home page microgames. Write a memo introducing a concept to involve staff's lazy time into productive activities. (15)
8. Write a free composition on any one of the followings: (35)  
 a) Cybersecurity measures, b) Natural disaster in Bangladesh

Khulna University of Engineering & Technology  
B. Sc. Engineering 1<sup>st</sup> Year 2<sup>nd</sup> Term Examination, 2023  
Department of Biomedical Engineering

**BME 1201**  
**Biochemistry**

**Time: 3 Hours**

**Full Marks: 210**

- N.B.** i) Answer **any THREE** questions from each section in separate scripts  
ii) Figures in the right margin indicate full marks.

**Section A**

(In Script A: Answer ANY THREE questions from this section)

1. a) Define amino acid. How could amino acid act as a buffer? Explain with suitable diagram. (10)  
b) Classify protein based on different criteria. Provide two examples for each. (12)  
c) What can we infer from the four protein structures? (05)  
d) What is chromatography? Describe the basics of chromatography technique. (08)
2. a) "Torsion angles determine the flexibility of a protein backbone." Justify the statement with suitable figures. (10)  
b) Compare between siRNA and miRNA. (08)  
c) Define enzyme. Describe the biomedical implications of enzymes. (07)  
d) What are the clinical applications of electrophoresis? (10)
3. a) Write down the functions of nucleotides. (05)  
b) What is RNA interference pathway? How do siRNA and miRNA regulate gene expression? Explain with diagram. (15)  
c) What is ELISA? Write down the types of ELISA. Explain the indirect ELISA with proper diagram. (15)
4. a) What is enzyme characterization? Briefly describe the techniques used to measure enzyme activity. (10)  
b) Write down the classification of enzymes with examples. (07)  
c) Write a short note on PCR. (10)  
d) What is recombinant DNA? Give an overview of recombinant DNA technology with a proper figure. (08)

**Section B**

(In Script B: Answer ANY THREE questions from this section)

5. a) What are biomolecules? Why are they called the building blocks of cell? Describe the geometry of carbon bonding in biomolecules. (15)  
b) Define molecular logic of life. Explain the underlying mechanism that governs the life of living organism. (10)  
c) Why lipids are exceptional biomacromolecules? (05)  
d) Classify organisms according to their source of energy. (05)
6. a) How are entropy and enthalpy related? How is the spontaneity of a reaction determined? (15)  
b) Compare between exergonic and endergonic reactions. (10)  
c) How is cyclization of monosaccharides performed? Mention different types of isomerism in sugars. (10)
7. a) How is glycogen synthesized in our body? What is the necessity of this process? (10)  
b) Where does citric acid cycle fit into cellular respiration? Briefly describe the steps of citric acid cycle. (15)  
c) What is the role of sodium in carbohydrate digestion? Give proper reasoning to your answer. (10)
8. a) Describe the different pathways of lipid metabolism. (20)  
b) Classify fatty acids with proper example. (15)

**CSE 1215**  
**Computer Programming**

**Time: 3 Hours**

**Full Marks: 210**

- N.B.** i) Answer **any THREE** questions from each section in separate scripts  
 ii) Figures in the right margin indicate full marks.

**Section A**

(Answer **ANY THREE** questions from this section in Script A)

1. a) What's the difference between structured programming and object-oriented programming? (10)
- b) Explain the compilation steps in C with necessary code examples and process flow diagram. (13)
- c) Write a C program that takes temperature in degree celsius as input and prints the corresponding weather condition based on the Table 1(c). Use the switch statement to solve it. (12)
2. a) Draw the flowchart for the control of "do while" loop. (07)
- b) Write a C program to print the pattern shown in Fig. 2(b). (12)

Table 1(c)

Temperature Range	Weather Condition
$\geq 30^\circ$	Hot
$\geq 20^\circ$ and $< 30^\circ$	Warm
$\geq 10^\circ$ and $< 20^\circ$	Cool
$< 10^\circ$	Cold

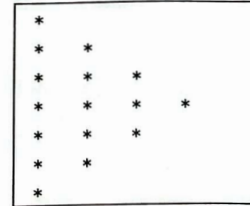


Fig. 2(b)

- c) Define a structure "Employee" with employee-name, department, salary, and a nested structure "Address" with house-no and postal-code. (16)
  - (i) Write a C program to input details for 3 employees, including the address from the console. Use loops to store and display all employee details with their address.
  - (ii) Write a function 'getAvgSalary(Employee[])' which takes an array of employee structure as input and outputs the average salary of those employees.
3. a) How does a structure differ from an array? Write down the difference between structure and union in C with proper examples. (10)
- b) Define FILE in C. Compare the file opening modes-read, write, append with proper examples of every mode. (10)
- c) What will be the output of the codes shown in Fig. 3(c)? Briefly explain your answer. (15)

<pre># include &lt;stdio.h&gt; int main () {     int a = 5;     int b = 4;     int c = a &amp; 1? a+++--b : a--b;     printf ("c:%d", c); }</pre>	
<pre># include &lt;stdio.h&gt; # define print (i) printf ("x" #i=%d, x##i*2); int main () {     # ifndef x5         # define x5 10     # else         # undef x5     # endif     print (5); }</pre>	<pre># include &lt;stdio.h&gt; int main () {     do {         while (i &gt; 2) {             printf ("A");             i--;         }         printf ("B");     } while (--i); }</pre>

Fig. 3(c)

4. a) Write short notes on the following C functions: (10)  
 i) strep ( ), ii) strem ( ), and (iii) strlen ( ).
- b) Why does a file have to be closed after opening? Describe the functionalities of fopen, fseek, fputs, and fclose with an example. (12)
- c) What's the difference between an Assembler and an Interpreter? Why C is called a mid-level programming language? (06)
- d) State the rules for defining a variable in C. (07)

### Section B

(Answer ANY THREE questions from this section in Script B)

5. a) What is programming? Draw the skeleton of a C program and name each section with brief description. (07)
- b) Define implicit typecasting with example. (10)
- c) Suppose X and Y are two unsigned datatypes of size 3 bits and 5 bits, respectively. Then consider the code shown in Fig. 5(c). what are the values that will be stored in variable x and y. (10)

```
# include <stdio.h>
int main ( )
{ X   x = 19;
  Y   y = 73; }
```

Fig. 5(c)

- d) What will be the output of the following code segments shown in Fig. 5(d) if a = 27, b = 14 and c = -11. (08)

```
(i)   c > 0 && a > b || a < 0
(ii)  a == b && c < 0
(iii) b/2.0 == 0 && a/2.0 != 0
(iv)  !(a! = b) || c/2.0 != 0
```

Fig. 5(d)

6. a) Enumerate the operators used in C programming with brief description and example. (15)
- b) What will be the output of the code segments shown in Fig. 6(b) if x = 5 and y = 10. (10)

```
(v)   x++ - y && (x | y)
(vi)  ++x - --y || (x & y)
(vii) (--x & y++) + y
(viii) x = -5
(ix)  x << 5
```

Fig. 6(b)

- c) Define bitwise left shift operator and bitwise right shift operator. Compare between logical AND operator and bitwise AND operator with examples. (10)
7. a) Write a C program to find the odd numbers from num [6] = {37, 89, 54, 76, 99, 101} with output. (06)
- b) List the string handling functions with brief description and example. (15)
- c) How will you access each value of an array using pointer? Explain with example. (10)
- d) Write a short notes on (04)  
 i) Pointer to pointer  
 ii) Array of pointers
8. a) Categorize a function depending on argument and return type. (12)
- b) Define recursion with example. Why exit condition is required in recursion? (08)
- c) List the storage classes in C programming with brief description and example. (08)
- d) Is it possible to return multiple values from a user defined function? If yes, design a user defined function which returns summation and subtraction of two integer values. (07)

**Math 1215**  
**Coordinate Geometry and Differential Equations**

**Time: 3 Hours**

**Full Marks: 210**

- N.B.** i) Answer **any THREE** questions from each section in separate scripts  
ii) Figures in the right margin indicate full marks.

**Section A**

(Answer **ANY THREE** questions from this section in Script A)

1. a) Transform the equation  $11x^2 + 24xy + 4y^2 - 20x - 40y - 5 = 0$  to the rectangular axes through the point  $(2, -1)$  and inclined at an angle  $\tan^{-1}\left(\frac{4}{3}\right)$  to the original axes. (12)
- b) Reduce the conic  $5x^2 - 24xy - 5y^2 + 4x + 58y - 59 = 0$  to the standard form and hence identify it. (15)
- c) Find the rectangular and spherical polar coordinates of a point whose cylindrical polar coordinates are  $(4\sqrt{5}, \tan^{-1}\left(\frac{1}{3}\right), -2)$ . (08)
  
2. a) Define direction cosines and direction ratios of a line. Find the acute angle between the lines whose direction cosines are given by the relations  $l + m + n = 0$  and  $l^2 + m^2 - n^2 = 0$ . (12)
- b) Compute the distance of the point  $P(-2, 1, 5)$  from the line through  $A(1, 2, 3)$  whose direction cosines are proportional to  $-1, -2, 3$ . (13)
- c) If the axes are rectangular, determine the equations of the line through the point  $(\alpha, \beta, \gamma)$  and which is right angles to the lines 
$$\frac{x}{l_1} = \frac{y}{m_1} = \frac{z}{n_1}; \frac{x}{l_2} = \frac{y}{m_2} = \frac{z}{n_2}.$$
 (10)
  
3. a) Find the equation of the plane passing through the line of intersection of the planes  $x + 2y + 3z = 4$  and  $2x + y - z + 5 = 0$  and is perpendicular to the plane  $5x + 3y + 6z + 8 = 0$ . (12)
- b) Find the equation of the plane that bisects the angle between the planes  $3x - 6y + 2z + 5 = 0$  and  $4x - 12y + 3z = 5$  which contains the origin. (13)
- c) Find the equation of the right circular cone whose vertex is at  $(2, -3, 5)$ , the axis passes through  $(1, -5, 3)$  and semi vertical angle is  $\pi/3$ . (10)
  
4. a) Determine the shortest distance between the lines 
$$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}; \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5},$$
 (13)  
and also find the equation of the shortest distance between the given lines.
- b) Find the equations of the sphere passing through the circle  $x^2 + y^2 + z^2 - 4x - y + 3z + 12 = 0$ ,  $2x + 3y + 7z = 10$  and touching the plane  $x - 2y + 2z = 1$ . (10)
- c) Find the equation of the sphere which touches  $3x + y - 4z - 12 = 0$  at  $(1, 1, -2)$  and is orthogonal to the sphere  $x^2 + y^2 + z^2 - 4x + 6y - 8z - 7 = 0$ . (12)

### Section B

(Answer ANY THREE questions from this section in Script B)

5. a) What is meant by the differential equation? Classify the differential equations with examples. (05)
- b) Define order and degree of a differential equation with examples. Form a differential equation for  $xy = Ae^x + Be^{-x} + x^2$ ; where,  $A$  and  $B$  are constants. Write down the order and degree of your final differential equation. (10)
- c) Solve: (10)
- $$x \sin y \, dx + (x^2 + 1) \cos y \, dy = 0; \quad y(1) = \pi/2.$$
- d) Solve the initial value problem: (10)
- $$(y + \sqrt{x^2 + y^2}) \, dx - x \, dy = 0; \quad y(1) = 0.$$
6. a) A bacteria culture is known to grow at a rate proportional to the amount present. After one hour, 1000 stands of the bacteria are observed in the culture and after four hours 3000 stands. Obtain an expression for the approximate number of stands of the bacteria present in the culture at any time  $t$  and hence find the approximate number of stands of the bacteria originally in the culture. (13)
- b) Solve the initial value problem: (10)
- $$x \frac{dy}{dx} - 2y = 2x^4, \quad y(2) = 8.$$
- c) Identify and solve: (12)
- $$y'' - y' - 12y = 0, \quad y(0) = 3, \quad y'(0) = 5.$$
7. a) Determine the general solution of (12)
- $$y'' - 3y' - 4y = 16x - 12e^{2x}.$$
- b) Apply the method of variation of parameters to solve: (12)
- $$y''' + y = \cot x.$$
- c) Identify and solve the following differential equation: (11)
- $$x^2 y'' - 4xy' + 3y = 0.$$
8. a) Determine the complete solution of (10)
- $$\frac{\partial^3 z}{\partial x^3} - 3 \frac{\partial^3 z}{\partial x^2 \partial y} + 4 \frac{\partial^3 z}{\partial y^3} = e^{x+2y}$$
- b) Using the method of separation of variables, solve: (10)
- $$\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u, \text{ where } u(x, 0) = 12e^{-5x}.$$
- c) Find the series solution of the differential equation: (15)
- $$4x \frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} + y = 0.$$

**EEE 1215**  
**Analog Electronics**

**Time: 3 Hours**

**Full Marks: 210**

- N.B.** i) Answer **any THREE** questions from each section in separate scripts  
 ii) Figures in the right margin indicate full marks.

**Section A**

(Answer **ANY THREE** questions from this section in Script A)

1. a) Define and classify semiconductors. Is it possible to see them as conductors and insulators? (08)
- b) Mention minimum eight differences between Half wave and Full wave rectifiers. (12)
- c) A crystal diode having internal resistance  $r_f = 20 \Omega$  is used for half wave rectification. If the applied voltage is  $V = 5 \sin \omega t$  and load resistance is  $R_L = 800 \Omega$ . Find (i)  $I_{peak}$ ,  $I_{dc}$ ,  $I_{rms}$ , (ii) ac power and dc power output, (iii) dc output voltage, and (iv) rectification efficiency. (15)
2. a) Explain  $\pi$ -filter to achieve smoother dc output. (08)
- b) Draw a circuit with zener diode to get stabilized output voltage. (05)
- c) Show that a transistor can be used as switch. (10)
- d) Draw the dc load line of the amplifier circuit shown in Fig. 2(d). Calculate its operating point. Given:  $\beta = 200$ ,  $V_{BE} = 0.7 \text{ V}$  (12)

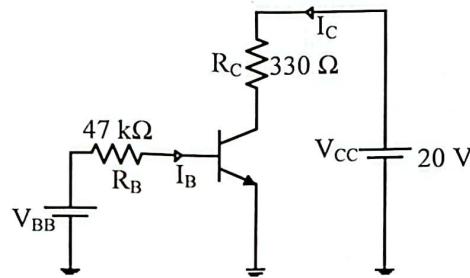


Fig. 2(d)

3. a) What are  $\alpha$ ,  $\beta$ , and  $\gamma$  for BJTs? Develop the relationship of  $\alpha = \frac{\beta}{\beta + 1}$ , where the symbols have their usual meanings. (12)
- b) Find  $V_{CE}$  and  $I_C$  from the amplifier circuit shown in Fig. 3(b). Given  $V_{BE} = 0.7 \text{ V}$  (11)

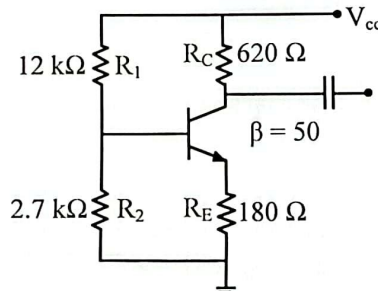


Fig. 3(b)

- c) Draw the hybrid model of a CE-transistor. Calculate  $A_v$ ,  $A_i$ , and  $R_i$  when  $R_s = 1 \text{ k}\Omega$  and  $R_L = 10 \text{ k}\Omega$ . (12)
4. a) Mention minimum ten differences between BJT and FET. (08)
- b) Explain the basic operation of n-channel enhancement type MOSFET. (12)



- c) Determine  $I_D$  and  $V_{DS}$  of the circuit shown in Fig. 4(c). (10)

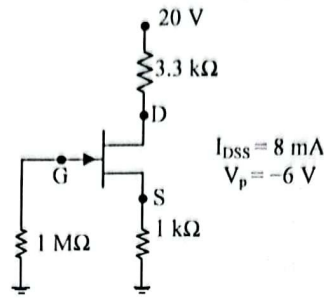


Fig. 4(c)

- d) Mention minimum five differences between D-MOS and E-MOS. (05)

### Section B

(Answer ANY THREE questions from this section in Script B)

5. a) Classify transistorized amplifier with respect to signal and conduction angle. (09)
- b) Analyze the final output of push-pull class B amplifier in terms of complete circuit, flow of signal and waveform. (16)
- c) A single stage class A power amplifier has  $V_{CC} = 20$  V,  $V_{CEQ} = 10$  V,  $I_{CQ} = 600$  mA,  $R_L = 16$  Ω and variation of ac output current = 300 mA. Calculate efficiency of power amplifier. (10)
6. a) Explain the merits and demerits of negative feedback amplifier. (09)
- b) Prove that for a standard feedback amplifier the amount of feedback is  $-20 \log(1 + A\beta)$ , where the symbols have their usual meanings. (08)
- c) You need to enhance the input resistance. What type of comparison ensure it? Series or Shunt? (12)
- d) Determine the voltage gain, input and output impedance of a voltage series feedback amplifier having  $A = -100$ ,  $R_i = 10$  kΩ,  $R_o = 20$  kΩ and  $\beta = -0.1$ . (06)
7. a) What is an Op-Amp? Mention its characteristics. (07)
- b) What is CMRR related to Op-Amp? Explain. (08)
- c) Prove that the amplifier shown in Fig. 7(c) acts as a summing amplifier. (10)

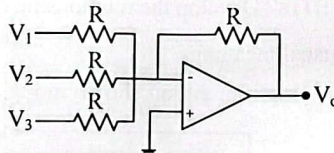


Fig. 7(c)

- d) Find the output voltage of the amplifier shown in Fig. 7(d). (10)

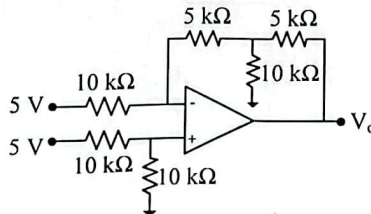


Fig. 7(d)

8. a) What is meant by controlled and uncontrolled rectification? How does an SCR work for controlled rectification? Explain. (13)
- b) Draw the i-v characteristics of a TRIAC. (05)
- c) What are DIAC and UJT? Mention their applications. (10)
- d) A thyristor has a forward breakover voltage of 150 V when a gate pulse of 2 mA is made to flow. Find the delay and conduction angle if a sine wave of 300 V peak is applied. (07)