

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2018
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 answer scripts.
ii) Figures in the right margin indicate full marks.

Section A

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

1. a) What is the functional group of monosaccharide? State the source and general properties of carbohydrate. (10)
- b) Classify carbohydrate along with example. (07)
- c) What is reducing sugar? Write down the composition of benedict reagent. How does benedict reagent react with reducing sugar? (08)
- d) Write short notes on any two of the followings: (10)
 - i. Dehydration synthesis;
 - ii. Complex carbohydrate;
 - iii. Oxidative phosphorylation.
2. a) Define digestion, absorption and metabolism. How does monosaccharide absorption take place in the intestinal mucosal cell? (10)
- b) What is gluconeogenesis? State the flow chart of gluconeogenesis. (10)
- c) Write down the classification of amino acid based on the polarity of side chain. List the name of essential amino acids. (07)
- d) Explain the stereoisometry of amino acids. What are the acidic and basic properties of amino acids? (08)
3. a) State Henderson-Hasselbalch equation. Write down the application of Henderson- Hasselbalch equation. (10)
- b) List the clinical application of electrophoresis and write down the types of electrophoresis. (10)
- c) Describe the protein structure with diagram. (10)
- d) Write short note on TCA cycle. (05)
4. a) What is the building block of lipid? Classify fatty acid according to the degree of unsaturation with the structure and example. (10)
- b) What is lipoprotein? Classify lipoprotein with example and their function. (10)
- c) Write down the physical properties of fatty acids. (05)
- d) Write short notes on the followings: (10)
 - i. Sphingolipid
 - ii. Wax.

Section B

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

5. a) What is macromolecule? Enumerate different types of macromolecules with example. Write down the differences between macromolecule and micromolecule. (10)
- b) What is DNA? Draw and label the Watson-Crick model of DNA. Explain the basic characteristics of DNA. (10)
- c) Define enzyme. Classify enzyme with examples. (10)
- d) Write short note on ATP. (05)
6. a) What is recombinant DNA? Enumerate the application of recombinant DNA technology in details. (15)
- b) What is t-RNA? Write down the structural characteristics of t-RNA. (10)
- c) Write down the basic principles of ELISA. Enumerate the importance of ELISA. (10)
7. a) What is southern blotting? Explain different steps of southern blotting in details. (15)
- b) Enumerate the process of cloning by simple diagram. (10)
- c) Explain the process of enzyme inhibition in details. (10)
8. a) What is PCR? Enumerate the basic steps of PCR. Write down the medical significance of PCR. (10)
- b) What is Chargaff's law? Draw the chemical structure of adenine and guanine. (10)
- c) Write short notes on: (15)
- i. Vector;
 - ii. Central dogma of molecular biology;
 - iii. Iso-enzyme.

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 answer scripts.
 ii) Figures in the right margin indicate full marks.

Section A

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

1. a) Suppose that the axes of a xy -coordinate system are rotated through an angle 45° to obtain a $x'y'$ -coordinate system. Find the equation of the curve $x^2 - xy + y^2 - 6 = 0$ in $x'y'$ -coordinate system and then identify it. (12)
- b) Determine equation of the curve $x^2 - 3y^2 + 4x + 6y = 0$ when the origin is transformed to the point $(1, -2)$. (08)
- c) Reduce the following equation to the standard form and hence identify the conic, (15)

$$x^2 - 5xy + y^2 + 8x - 20y + 15 = 0.$$
2. a) Find the Cartesian and spherical polar coordinates for a point whose cylindrical polar coordinates are $(4\sqrt{5}, \tan^{-1}(-\frac{1}{2}), 1)$. (10)
- b) Define direction cosines and direction ratios of a line. Direction cosines of two lines are given by the equation $l + m + n = 0$ and $m^2 + l^2 - n^2 = 0$. Find the angle between two lines. (13)
- c) Determine the distance of the point $P(2, 1, -3)$ from the line through the point $A(2, 3, -5)$ whose direction cosines are proportional to $1, 2, -3$. (12)
3. a) What is meant by the plane? A plane meets the coordinate axes in A, B, C such that the centroid of the triangle ABC is (p, q, r) , then show that the equation of the plane is $\frac{x}{p} + \frac{y}{q} + \frac{z}{r} = 3$. (10)
- b) If the axes are rectangular, then show that the equation of straight line through the point (α, β, γ) is perpendicular to the straight lines, (10)

$$\frac{x}{l_1} = \frac{y}{m_1} = \frac{z}{n_1} \text{ and } \frac{x}{l_2} = \frac{y}{m_2} = \frac{z}{n_2} \text{ if } \frac{x-\alpha}{m_1n_2-m_2n_1} = \frac{y-\beta}{n_1l_2-n_2l_1} = \frac{z-\gamma}{l_1m_2-l_2m_1}$$
- c) Prove that the lines $\frac{x-a+d}{\alpha-\delta} = \frac{y-a}{\alpha} = \frac{z-a-d}{\alpha+\delta}$ and $\frac{x-b+c}{\beta-\gamma} = \frac{y-b}{\beta} = \frac{z-b-c}{\beta+\gamma}$ are coplanar (15) and find the equation of the plane in which they lie.
4. a) Find the length of the shortest distance and its equation between the lines, (15)

$$\frac{x+1}{2} = \frac{y-3}{3} = \frac{z+3}{-4} \text{ and } \frac{x-2}{-3} = \frac{y+4}{4} = \frac{z-5}{5}$$
- b) Determine the equation of the sphere with center at $(1, -2, 3)$ and touches the plane $6x - 3y + 2z = 4$. (10)
- c) What is meant by the right circular cone? Find the equation of the right circular cone whose vertex is origin, axis OX and semi-vertical angle α . (10)

Section B

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

5. a) What is meant by the differential equation? Classify the differential equations. Form a differential equation from the following relation $y^2 = Ax^2 + Bx + C$. (10)
- b) Find a particular solution of the differential equation $y'' - 4y' + 5y = 2$ when $y(0) = 1$ and $y'(0) = 2$. (10)
- c) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$. Subject to the boundary conditions $u(0, t) = 0$; $u(2, t) = 0$ and $u(x, 0) = 3 \sin 2\pi x$. (15)
6. a) Identify and solve the following differential equation $(x^2 + 1)y' + 4xy = x$, $y(2) = 1$. (12)
- b) Solve $(2x + 3y + 1)dx - (4x + 6y + 2)dy = 0$. (13)
- c) Find the general solution of $y''' - 4y'' - 3y' + 18y = 0$. (10)
7. Identify and solve the following differential equations:
- a) $y'' + 6y' + 9y = xe^{-3x} \cos x$ (13)
- b) $y'' + 3y' - 4y = e^{-4x} + 2 \sin 3x$ (10)
- c) $x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} - 4y = x^3$ (12)
8. a) Find the general solution of $(D^2 - 2D + 1)y = xe^x \ln x$, $x > 0$ by the method of variation of parameters. (15)
- b) Define ordinary point, singular point and regular singular point of a differential equation with example. Use the method of Frobenius to find a series solution of the differential equation $2x^2 y'' + xy' + (x^2 - 3)y = 0$ in some interval $0 < x < R$. (20)

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2018
Department of Biomedical Engineering
CSE 1215
Computer Programming

Time: 3 hours

Full Marks: 210

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

Section A

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

1. a) What is meant by structured programming? Is C programming an example of structured programming? Justify your answer. (07)
- b) Differentiate between programming and programming language. "Programming language is like natural language"- explain this statement. (07)
- c) What are the control structures in the C programming language? Explain with appropriate examples. (07)
- d) Discuss about the types of data available in C. Give a short description about variable declaration with example. (08)
- e) Write a program to calculate the volume and area of a sphere. (06)
2. a) Define increment and decrement operator with examples. (05)
- b) Explain how a else-if ladder works with proper example. (08)
- c) Write down the significance of Switch in C programming. Why default is used in Switch? Give a proper example of Switch. (08)
- d) Write a C program to check whether a number is Palindrome or not. (07)
- e) Observe the following program: (07)

```
int main() {  
    int x = 101,  
    int y = 201,  
    ++x;  
    int a = ++(x+y)  
    printf("a = %d", a); }
```

What will be the output of this program?
3. a) Which loop will guaranty that it will execute at least one time? Provide the syntax, flow diagram and an example of this loop. (07)
- b) What are the loop control statements available in C? Explain with appropriate examples. (10)
- c) Write a C program to print the following output: (10)

```
0  
0 1  
0 1 0  
0 1 0 1  
0 1 0 1 0
```
- d) Determine the value of each of the following logical expressions if a = 27, b = 14, c = -11 (08)
 - i. $c > 0 \ \&\& \ a > b \ || \ a < 0$
 - ii. $a == b \ \&\& \ c < 0$
 - iii. $(b/2.0 == 0 \ \&\& \ a/2.0 != 0) \ || \ b < a$
 - iv. $!(a != b) \ || \ c/2.0 != 0$
4. a) How can you initialize a 2-dimensional array of size 4 by 3? Give an example and with that example write a program to find the transpose of that matrix. (12)
- b) Discuss 'break' and 'continue' statements with examples. Why the use of 'goto' statement is generally discouraged? (08)
- c) What is meant by 'call by reference'? Write a C program to swap numbers in cyclic order using call by reference. (10)
- d) Write down the significance of pointer in C programming. (05)

Section B

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

5. a) What is array? How can you initialize arrays when they are declared? How does array help you to solve problem in easier way? (09)

b) How can array be passed to a user defined function? Explain it with example. (08)

c) Write the output of the following program: (06)

```
main()
{
  int i, j, x = 0;
  for (i = 0; i < 4; ++i)
    for (j = 0; j < i; ++j) {
      x += (i + j - 1);
      printf("%d\n", x); } }
```

d) Using two dimensional array create the following multiplication table- (12)

	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

6. a) What is the limitation of 'scanf' function for reading string? How you will solve the problem? (07)

b) Write the output of the following program: (08)

```
main()
{
  int c, d;
  char st[100] = "C Programming";
  for (c = 0; c <= 6; c++) {
    d = c+1;
    printf("%-6 .* s \n",d, st); } }
```

c) Write a C program to store the information of a student (including roll, marks, and grade) in a file and find the size of the file. (12)

d) "All character arrays are not string but all strings are character arrays"- justify the statement with example. (08)

7. a) Write the differences between the followings - (09)

- Array and structure
- Structure and union
- Nested structure and array of structures.

b) Write a program which will have a 'exchange' function that will take two variable's addresses as arguments and will exchange these values. (12)

c) Define the followings with examples- (09)

- Actual and formal parameter
- Recursion function
- Call by value and call by reference.

d) What are the advantages of using pointers? How a pointer is declared? (05)

8. a) What is file? Describe how to open a file in different modes. (10)

b) Write a program which will write some data to a file and finally the program copy all the data to another file. (10)

c) Describe the following functions- (08)

- getc()
- feof()
- fseek()
- rewind()

d) Briefly describe the elements of OOP. (07)

Khulna University of Engineering & Technology
B. Sc. Engineering 1st Year 2nd Term Examination, 2018
Department of Biomedical Engineering
Hum 1215
Technical English

Time: 3 hours

Full Marks: 210

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

Section A

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

1. a) Fill in the blanks with modal verbs: (14)
- i. The train was full. I _____ hardly find a seat anywhere.
 - ii. I learnt to read music as a child. I _____ read it when I was five.
 - iii. You _____ start early.
 - iv. I _____ read a novel than go to cinema.
 - v. If your mother disapprove of the plan, you _____ give it up.
 - vi. _____ I see the letter, Sir?
 - vii. Tina was _____ leave work early yesterday.
- b) Change the following words as asked in brackets and use the changed forms in sentence: (12)
Inspire (into noun), Counter (into verb), Material (into verb), Dip (into verb), Choice (into verb), Intrude (into noun).
- c) Complete the following sentences with clauses as asked in brackets: (09)
- i. _____ satisfies the teacher. (Noun clause)
 - ii. _____ he is unsuccessful in life. (Adv. clause)
 - iii. Rakib, _____, is a teacher. (Adj. clause)
 - iv. The fame with his name is _____. (Noun clause)
 - v. _____ he feels cold. (Adv. clause)
 - vi. Habib works in the factory, _____. (Adj. clause)
2. a) Make WH-question with the underlined words of the following sentences: (14)
- i. Azad met me at the playground.
 - ii. Monir doesn't like what Pip says about you.
 - iii. The train can leave the station at 8:30pm.
 - iv. He runs the car 30 miles per hour.
 - v. The river is very deep.
 - vi. He struck him in the head.
 - vii. Masum goes to school every day.
- b) Express the following notions/ emotions in sentences: (12)
i) Good wishes ii) Anger iii) Indifference iv) Invitation v) Anxiety vi) Agreement.
- c) Write two synonyms for the words given below and use the synonyms in sentence: (09)
Crude, Mobile, Delight.
3. a) Transform the following sentences as asked in brackets. (14)
- i. Your coming here is mysterious. (complex)
 - ii. They call Roni with the title, addressed by the peoples (complex)
 - iii. He not only read but also wrote the poem. (simple)
 - iv. He walks fast, but can't reach in class in time. (complex)
 - v. He is lazy and can't cut a good figure in exam. (complex)
 - vi. Monir is as talented as his sister. (comparative)
 - vii. Honesty is the best policy. (negative)
- b) Change the following words as asked in brackets and make sentences with the changed forms: (12)
Vital (into verb), offend (into adjective), patron (into verb), vary (into noun), settlement (into adjective), govern (into adverb).

- c) Make sentences using the words as directed: (09)
 Either (as pronoun), honor (as noun), after (as conjunction), so (as adverb), near (as adjective), since (as preposition).
4. a) Make new words with the following prefixes and suffixes and make sentences with the new words: (12)
 Hyper _____, Pre _____, De _____, _____ age, _____ th, _____ ant.
- b) Correct the following sentences: (14)
- i. president is supposed to come in Khulna very soon.
 - ii. He enjoys the sunshine in the morning.
 - iii. He is Masum's true friend.
 - iv. He which tells is wrong.
 - v. When he is lame, he can't walk properly.
 - vi. We doubt when he comes.
 - vii. Labib, whom pen is lost, feels uneasy.
- c) Write a synonym and an antonym for each of the words and use the new words in sentences: (09)
 Delude, Amateur, Belligerent.

Section B

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

5. a) Read the passage and answer the following questions: (20)
- While it is a well-known fact that yoga, certain kinds of music and some calming foods can relieve stress, the latest trend is the search for certain scents with calming properties that can help a person to soothe the nerves.
- One such scent that is now being touted as having calming properties is lavender. It has long been a popular ingredient used in most spas as the scent is believed to help one sleep better. To test its properties one can opt for a lotion with lavender as its ingredient. An even better option is to spray the scent on the pillow for a sound sleep.
- Everyone has heard of mint chutney that is served with samosas and pakoras, but few would think of applying a mint based paste on one's body. Yet this is just what is recommended for those who would like a purifying effect on the mind, brought about by this application.
- Citrus fruits are not only good for health but also serve as good mood lifters. Sniffing lemon zest is believed to soothe over stress and the smell of grapefruit is known to curb depression. Other advantages include memory enhancement from smelling oranges. Therapists also recommend that one can light an orange-scented candle by one's side, in the bath, and imbibe the same benefits.
- For that nagging headache that comes on whenever you step out into the scorching sun, there is yet a cure available from the array of calming scents. According to some researchers sniffing at a green apple cannot only cure a headache but help alleviate it altogether.
- i. What does the latest research into scents reveal?
 - ii. What are the latest findings of the properties of lavender?
 - iii. How do citrus fruits help in calming the body?
 - iv. What are the properties of green apple?
- b) Make a précis of the above written passage with a suitable title. (15)
6. a) Amplify the idea contained in the statement "Absolute power corrupts absolutely". (20)
- b) Write a list paragraph on 'A perfect job'. (15)
7. a) Suppose you are the President of Johnson & Johnson group. Write a memo announcing the annual company picnic which will be held at the Memorial Park, Singapore. Plan the event and ask all staff to join with a family member or a friend. (18)
- b) Amplify the idea 'Morning shows the day'. (17)
8. a) Write a free composition on one of the followings: (35)
- i. Teacher-student relationship
 - ii. Technological zombies.

Khulna University of Engineering & Technology
 B. Sc. Engineering 1st Year 2nd Term Examination, 2018
 Department of Biomedical Engineering
 EEE 1215
 Analog Electronics

Time: 3 hours

Full Marks: 210

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

Section A

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

1. a) What is doping of semiconductor? Why this is necessary? Explain the formation of depletion layer in a pn junction. (13)
- b) "The efficiency of a full wave rectifier is double than that of a half wave rectifier"- justify this. (09)
- c) Draw the characteristics curves of a rectifier and zener diode mentioning all significant regions and differentiate between them. (06)
- d) Draw the simplified diode model. Using this model solve the following network and find V_Q and I_D . (07)

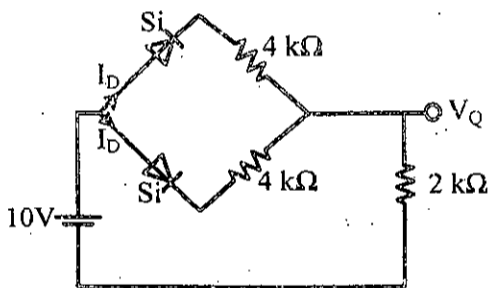


Fig. Q1(d)

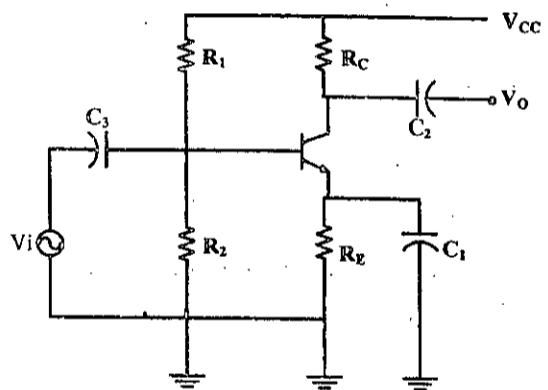


Fig. Q3(c)

2. a) Define PIV. Write down its significance. (05)
- b) "Zener diode acts as a voltage stabilizer"- justify this statement. (10)
- c) Drive the following expressions of BJT- (08)
 - i. $\beta = \frac{\alpha}{1-\alpha}$,
 - ii. $I_E = (\beta + 1)I_B + (\beta + 1)I_{CBO}$
 Where the symbols have their usual meanings.
- d) What is faithful amplification of transistor? How this can be ensured? "Transistor acts as a switch"- justify this. (12)
3. a) What is meant by transistor biasing? Show that a transistor in common-emitter configuration can act as an amplifier. (10)
- b) Derive the expression of stability factor of a transistor? Explain the transistor switching time. (09)
- c) Draw the AC and DC equivalent circuit of the above Fig. Q3(c). (08)

- d) For the common-bas circuit shown in Fig. Q3(d), determine I_C and V_{CB} . Assume the (08)
transistor to be of silicon.

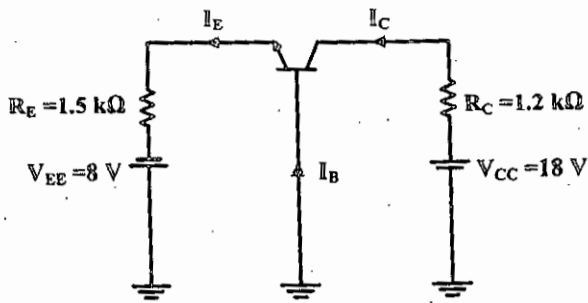


Fig. Q3(d)

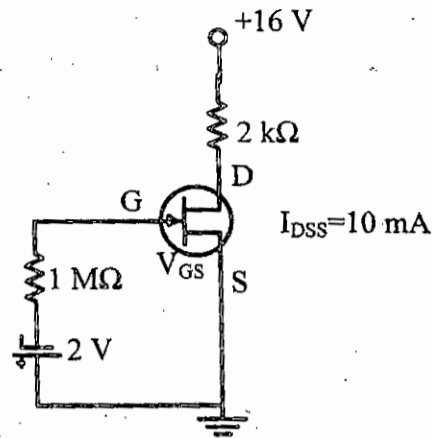


Fig. Q4(d)

4. a) Write down the differences between BJT and FET devices. Classify FETs with their (10)
specific symbols.
- b) Draw the transfer characteristics of p-channel D-MOSFOT and E-MOSFET. (05)
- c) Show that CMOS can be act as an inverter. Also explain operating characteristics of NMOS (10)
devices.
- d) Determine the followings for the network shown in above Fig. Q4(d): (10)
(i) V_{GSQ} (ii) I_{DQ} (iii) V_{DS} (iv) V_D (v) V_G

Section B

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

5. a) Define op-amp. Write down the salient features of op-amp. (06)
- b) Draw the circuit diagrams using op-amp which provide the following output voltage: (10)
i. $V_0 = R_1 + L \frac{di}{dt} + \frac{1}{C} \int i dt$ ii. $V_0 = \frac{R_F}{R_1} (V_2 - V_1)$
- c) What is virtual ground and summing point of an op-amp? A 5mv, 1 kHz sinusoidal signal is (10)
applied to the input of an op-amp integrator for which $R=100 \text{ k}\Omega$, $C=1\mu\text{F}$. Find the output
voltage.
- d) Calculate the overall voltage gain for an instrumentation amplifier. (09)
6. a) Draw the two transistor model of an SCR. Explain SCR characteristics indicating holding (07)
current, forward and reverse blocking regions also write down its applications.
- b) Define negative resistance region from UJT characteristics curve. For UJT relaxation (08)
oscillator, show that $f = \frac{1}{R_1 C \ln[\frac{1}{(1-\eta)}]}$; where the symbols have their usual meanings.
- c) With neat sketch, explain the working principle of a SCR as half wave rectifier. Also derive (08)
the expression of average output voltage and current.

- d) Given the relaxation oscillator as in Fig. Q6(d) Find-
- R_{B1} and R_{B2} at $I_E = 0A$.
 - Determine V_p , the necessary voltage to turn on UJT.
 - Determine permissible range of R_1 .

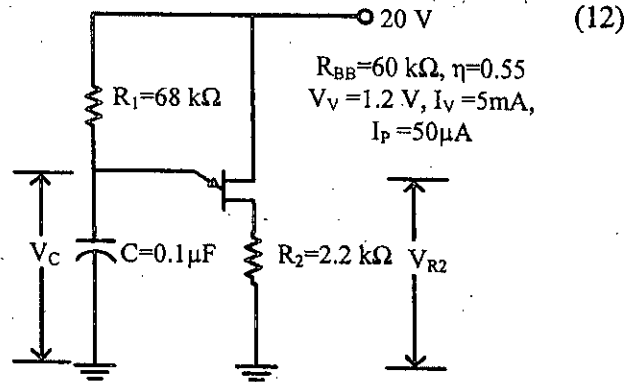


Fig. Q6(d)

7. a) Define passband and stopband of an active filter. Design an active bandpass and band-elimination filter using lowpass and highpass filter and show their frequency response curve. (10)
- b) Write down the difference between small signal and large signal analysis. For the network shown below in Fig. Q7(b), determine: (i) r_e (ii) z_i (iii) z_o (with $r_o = \infty \Omega$) and (iv) A_v (with $r_o = \infty \Omega$), where every symbol have their usual meanings. (15)

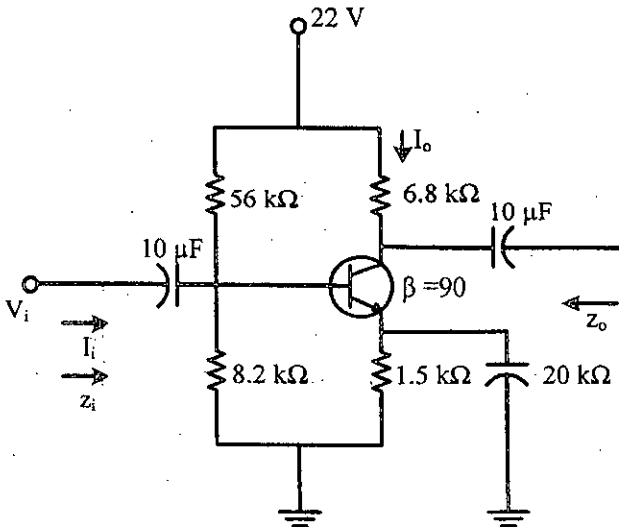


Fig. Q7(b)

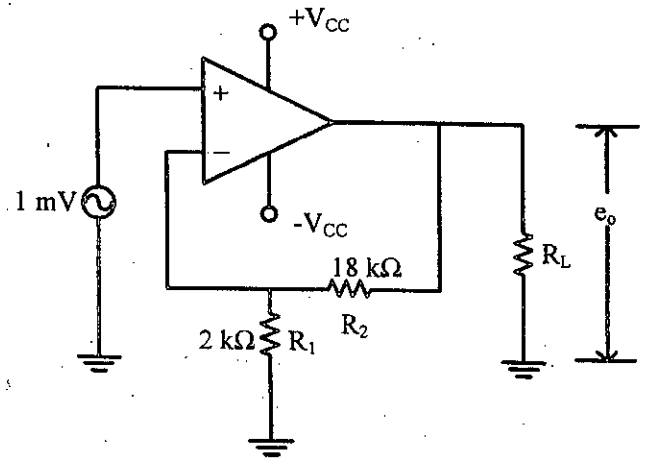


Fig. Q8(d)

- c) Explain the performance parameters of power amplifier. Also classify power amplifier based on mode of operation with appropriate diagrams. (10)
8. a) Define and classify Tuned amplifier. Explain the operation of transformer-coupled push-pull amplifier circuit. (10)
- b) What is meant by feedback amplifier? Why negative feedback is frequently used in amplifiers? (05)
- c) Explain the operating principle of phase shift oscillation. Also write down the difference between Colpitt and Hartley Oscillator. (12)
- d) Above Fig. Q8(d) Shows the negative voltage feedback amplifier. If the gain of the amplifier without feedback is 12000, find (i) Feedback fraction, (ii) Overall voltage gain, (iii) Output voltage if input voltage is 1 mv. (08)

