G 5493 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 405 – DIGITAL SYSTEMS AND COMPUTER ORGANISATION [EE]

(New Scheme – 2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. State Demorgan's theorem.
2. What is the difference between MUX and DEMUX? Explain.
3. Differentiate synchronous counter from asynchronous counter.
4. What is the principle of Carry look ahead Adder? Explain.
5. Explain the principle of I/O interfacing. Explain.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Define and explain the parameters of logic families.
7. Explain the truth tables and excitation tables of OFF and TFF.
8. Draw a twisted ring counter and explain it in detail.
9. Draw the block diagram of USB and explain it in-detail.
10. Differentiate SRAM and DRAM. Explain the difference.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. (i) Explain a 1:4 DEMUX with a neat schematic diagram.

(ii) Draw a BCD to 7 segment decoder and explain it.

Or

12. (i) Explain the characteristics of CMOS in detail.

(ii) Differentiate CMOS and TIL logic families.

13. Realize a SRFF from JK FF using only NOR gates. Explain the procedure in detail.

Or

14. Draw an Mod N ripple counter and explain its design procedure in detail.

15. Explain the types of shift registers in detail with neat diagrams.

Or

16. (i) Design a 2-bit up down synchronous counter and realize the same using SR FF.

(ii) Differentiate counters from shift registers.

17. Explain a full subtractor circuit with a neat block diagram. Design a full subtractor using the basic gates.

Or

18. (i) Explain the steps to design fast adders with a neat diagram.

(ii) Explain the 2's compliment adder in detail, with a neat diagram.

19. Explain the semiconductor memories with diagrams. Explain the features of EEPROM and UVPROM.

Or

20. (i) Draw the block diagram of SCSI and explain it in detail.

(ii) Give an account on (a) Organization of memory chips ; (b) Flash memory ; (c) Bus structure.

(5 × 12 = 60 marks)

G 5462 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 402—D.C. MACHINES AND TRANSFORMERS (EE)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. What are compensating windings ?
2. Define critical field resistance and critical load resistance.
3. Give reason why series motors are not started on no-load condition.
4. What are the important factors in core design of distribution transformer ?
5. What are the drawbacks in open delta connection of 3-phase transformers ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain reactance e.m.f. and how it affects the performance of DC machine.
7. Discuss the advantages of parallel operation of generators. Why shunt generators are preferred for satisfactory parallel operation ?
8. Explain the necessity of starter for large DC motors. Why direct switching is permissible for small motors ?
9. Define voltage regulation in transformer and obtain the approximate expression for the same.
10. Explain all day efficiency and how is it obtained, knowing the daily load cycle.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Discuss the methods of improving commutation. (6 marks)

Turn over

(b) A 4 pole lap wound shunt generator supplies 50 lamps of 100 watts, 200 V each. The field and armature resistances are 50 Ω and 0.2 Ω respectively. Allowing a brush drop of 1V/brush, calculate the following (i) Armature current ; (ii) Current/path ; (iii) Generated e.m.f. ; (iv) Power output of armature.

(6 marks)

Or

12. (a) Derive the EMF equation of DC generator. (6 marks)

(b) A 4 pole, 40 kW, 200 V, wave wound shunt generator has 420 conductors. Calculate the demagnetising ampere turns/pole if shunt field resistance is 40 Ω. Also calculate extra shunt field turns/pole to neutralise demagnetisation.

(6 marks)

13. (a) Explain power flow diagram in DC generator. (6 marks)

(b) Two 220 V generators operate in parallel. First machine has terminal voltage of 260 V on no-load and 220 V when supplying 30 A. The second machine has 270 V on load and 220 V when supplying 45 A. Calculate (i) Output voltage ; (ii) Power output of each machine if total load current is 65 A. Assume external characteristics to be linear.

(6 marks)

Or

14. (a) Explain the load characteristics of compound generators. (6 marks)

(b) A long shunt generator has armature resistance of 0.1 Ω, series fed resistance 0.02 Ω and shunt field resistance 100 Ω. It supplies FL current of 100 A at 240 V. The strey losses are 1500 W. Calculate the FL efficiency.

(6 marks)

15. (a) Explain retardation test in DC motor. (6 marks)

(b) A 440 V, 4 pole lap wound shunt motor has no-load input current of 15 A and shunt field current of 10 A. On full-load it takes 150 A. If armature resistance = 0.1 Ω, flux per pole on no-load = 0.05 Wb, No. of armature conductors = 750 and contact drop/brush = 1 V. Calculate (i) no-load speed ; (ii) FL speed ; (iii) Percentage speed regulation.

(6 marks)

Or

16. (a) With block diagram, explain solid state speed control in DC motor. (6 marks)

(b) A 200 V, DC shunt motor takes FL current of 12 A. Armature and shunt field resistances are 0.3 Ω and 100 Ω. Calculate the step resistances in the 6 stud starter. The maximum starting current is not to exceed 1.5 times the FL current.

(6 marks)

17. (a) Explain the operation of transformer when loaded. (6 marks)

(b) A 200/400 V, single-phase transformer takes 10 A and 85 W at 15 V during SC test with LV side shorted. Calculate the secondary terminal voltage when delivering 5 kW at 0.8 p.f. lagging the primary voltage being 200 V.

(6 marks)

Or

18. (a) Draw and explain the phasor diagram of transformer for lagging power factor load.

(6 marks)

(b) Two 100 kW single-phase transformers are operating in parallel. The first transformer has ohmic drop of 0.5 % and reactance drop of 8 % at full-load. The corresponding values for second transformer are 0.75 % and 4 %. Show how they will share a load of 180 kW at 0.9 power factor.

(6 marks)

19. Explain in detail how three-phase to three-phase and three-phase to two-phase transformation can be accomplished with the help of two transformers.

Or

20. (a) Explain the various methods adopted in cooling of large transformers. (6 marks)

(b) Discuss the construction of auto-transformer and copper saving associated with it. List out its applications.

(6 marks)

[5 × 12 = 60 marks]

17. (a) Sketch the root locus for a control System with $G(s)H(s) = \dfrac{k(s^2+2s+10)}{s^2+6s+10}$.

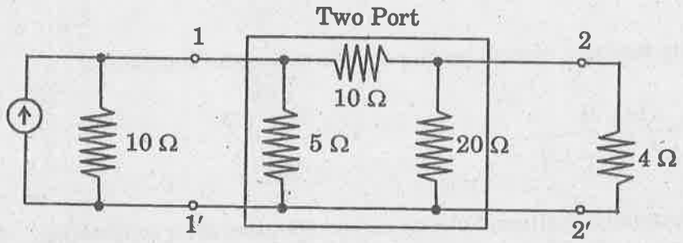
(b) Show that the root loci are the arcs of a circle centered at the origin and radius equal to $\sqrt{10}$.

(c) Determine the range of values of k for which the system is over damped.

Or

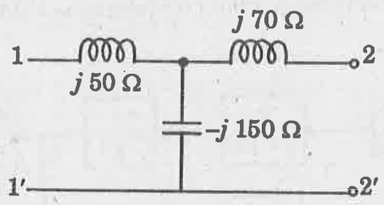
18. Construct Routh array and determine stability of system whose characteristic equation is $s^6+2s^5+8s^4+12s^3+20s^2+16s+16=0$. Also determine the number of roots lying on right of Splane, left half splane and on imaginary axis.

19. Find short circuit Y parameters for the two port shown in Fig, which is terminated with a current source on the input side and a load resistor of 4 ohm on the output side Evaluate V_1 and V_2.



Or

20. Find short circuit Y parameters of the two port shown :



(5 × 12 = 60 marks)

G 5469

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 403—LINEAR SYSTEM ANALYSIS [EE]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Distinguish between linear and non-linear system with suitable example.
2. Define state model, state variables.
3. Write short note on Dynamic error co-efficients.
4. Discuss the effect of addition of poles and zeros on root locus.
5. What do you mean by driving Point function ?

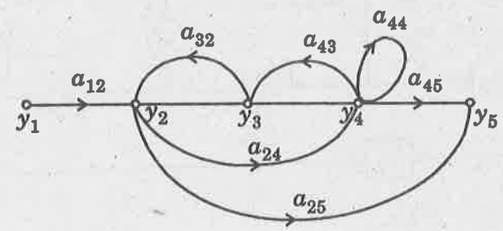
(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Obtain the transfer function of an armature controlled d.c. motor.

7. Find the transfer function $\dfrac{Y_s}{Y_1}$ Using Mason's Gain formula.



8. What are time domain specifications ?

9. State Liapunov stability theorems.

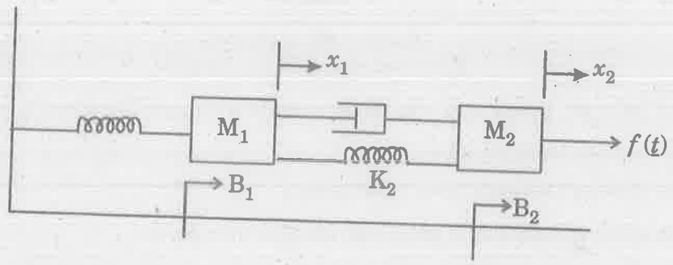
10. Obtain the pole-zero plot of the transfer function $\frac{20(4s+2)}{s^3+5s^2+8s+2}$.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Obtain the transfer function of the following Mechanical System

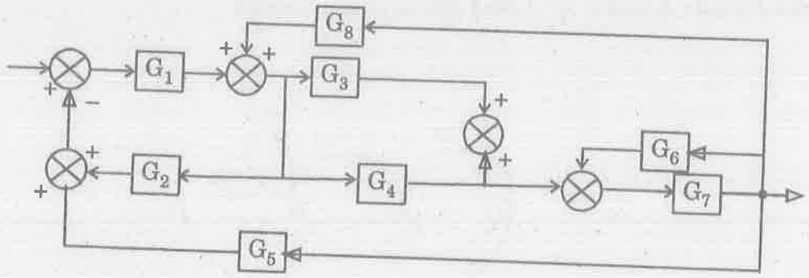


Or

12. (a) Discuss Mathematical modelling of a mechanical translational and rotational system.

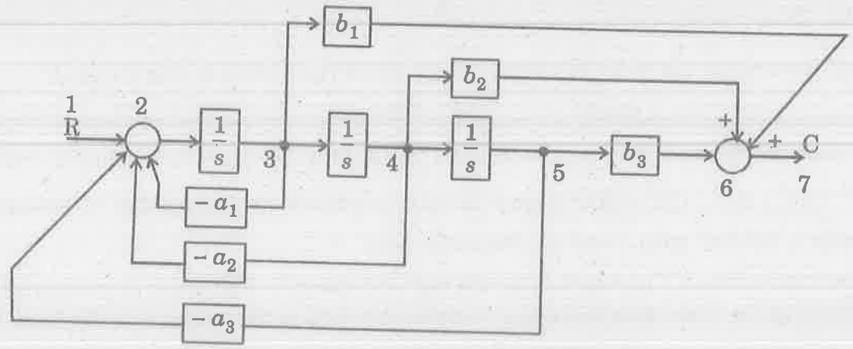
(b) Explain how linearization of a non-linear model in done.

13. Find the Transfer function for the system shown in Fig.



Or

14. Draw the Signal flow graph and determine the overall Transfer function :



15. For a Unity feedback system having open loop transfer function as

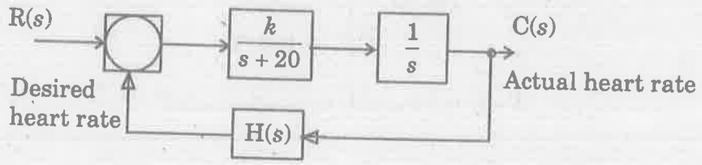
$$G(s) = \frac{k(s+2)}{s^2\left(s^2+7s+12\right)}$$

(a) Determine Position, Velocity and acceleration error constants.

(b) Steady state error for Parabolic input.

Or

16. The block diagram of an electronic pace maker for controlling the rate of heart beats is shown in Fig. Assuming Unity feedback and k = 400 calculate (a) The output $c(t)$ for unit step input ; (b) Steady state error for unit ramp input ; (c) determine k if the error to a ramp input is 0.02.



19. Determine whether the following pairs of fields satisfy Maxwell's equations in the region where $\sigma = 0, \epsilon = 2.5\,\epsilon_0, \mu = 10\mu_0$

(a) $\bar{E} = 3y\,\hat{a}_y \quad \bar{H} = 4x\,\hat{a}_x$

(b) $\bar{E} = 100 \sin\left(6 \times 10^7 t\right) \sin z\,\hat{a}_y, \bar{H} = -0.1328 \cos\left(6 \times 10^7 t\right) \cos z\,\hat{a}_x$

Or

20. (a) Find the frequency at which conduction current density and displacement current density are equal in a medium with $\sigma = 2 \times 10^{-4}\ s/m$ and $E_r = 81$.

(6 marks)

(b) A plane wave is incident normally on a large sheet of copper. If the frequency and peak $\bar{E}$ of the incident wave is 100 MHz and $1v/m$ respectively, find the power absorbed per unit area by the copper sheet.

(6 marks)

[5 × 12 = 60 marks]

G 5481 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 404—ELECTROMAGNETIC THEORY (EE)

[New Scheme—2010 Admission onwards]

(Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Express $\bar{A} = \left(x^2 - y^2\right)\bar{a}_y + xz\bar{a}_z$ in cylindrical co-ordinate system at $r = 6, \phi = 60°$ and $z = -3$.
2. A uniform line charge $\rho = 2nc/m$ lies in the $z = 0$ plane parallel to the x-axis at $y = 3m$. Find the potential difference V_{AB} for the points A (2, 0, 6) and B (0, 0, 0)m.
3. Explain the concept of energy, considering a parallel plate capacitor.
4. State Ampere's law in integral form as used in magnetic field.
5. Explain the significance of displacement current.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. State and explain divergence theorem.
7. Derive and expression for the potential due to a dipole and hence find an expression for $\vec{E}$ field.
8. Explain the boundary conditions for static dielectric media.
9. Obtain an expression to find the inductance of a solenoid.
10. State and explain the significance of poynting theorem.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Two points are given as $A(-1, 2, -3)$ and $B(1, 2, 3)$ give the vector that extends from A to B in :

(i) Cartesian co-ordinates ;

(ii) Cylindrical co-ordinates ; and

(iii) Spherical co-ordinates. (6 marks)

(b) Find the force due to two point charges $Q_1 = 4mc$ and $Q_2 = 2mc$ located at $P(3, 2, -1)$ and $Q(-1, -1, 4)$ on a charge $Q_3 = 20nc$ located at $R(0, 3, 1)$. (6 marks)

Or

12. (a) Find the total charge lying within a sphere $r = 4$ if $\bar{D} = \frac{\hat{a}_r}{r^2}$ using Gauss's law in integral form.

(3 marks)

(b) Evaluate both sides of divergence theorem for $\bar{D} = 2xy\,\hat{a}_x + x^2\,\hat{a}_y\ c/m^2$ for the region defined by $0 \le x \le 1,\ 0 \le y \le 2,\ 0 \le z \le 3$.

(9 marks)

13. Potential is given by $V = 2(x+1)^2\,(y+2)^2\,(z+3)^2$ Volt in free space. Calculate :

(i) potential

(ii) $\cdot\ \bar{E}$.

(iii) $\bar{D}$; and

(iv) ρ_v at a point $A(1, 2, 3)$.

Or

14. (a) Derive Laplace's equation and show that the potential field given by the equation $V = 2x^2 - 3y^2 + z^2$ satisfies the Laplace's equation.

(9 marks)

(b) Explain the concept of electric dipole moment.

(3 marks)

15. (a) Derive an expression for the capacitance of a parallel plate capacitor.

(6 marks)

(b) Find the relative permittivity of the dielectric material present in a parallel plate capacitor if, $s = 0.12m^2$, $d = 80\mu m$, $V_0 = 12V$ and the capacitor contains $1\mu J$ of energy.

(6 marks)

Or

16. What is a boundary condition and how do boundary conditions arise ? Region 1 is the semi-infinite space in which $(2x - 3y) > 0$, while region 2 is defined by $(2x - 3y) < 0$. Let $\mu_{R_1} = 3$, $\mu_{R2} = 4$ and $H_1 = 30a_x$ A/m . Find :

(a) B_1,

(b) B_{N_1}

(c) H_{t_1}

(d) H_2

17. (a) Discuss the application of Ampere's circuital law for unsymmetrical surfaces. (6 marks)

(b) Calculate the magnetic flux density due to a coil of 100 A and area $50cm^2$.(i) on the axis of the coil at a distance of 10 m from centre ; and (ii) at a point 10 m in a direction at right angle to the axis.

(6 marks)

Or

18. (a) State and explain the boundary conditions at the interface between two different magnetic materials.

(6 marks)

(b) An iron ring or toroid 0.2 m min diameter and 10.0 cm^2 cross-sectional area of the core is uniformly wound with 250 turns of wire. If the flux density in the core is 1.0 Tesla and permeability of iron is 500, find the exciting current in the winding. Also determine the value of self inductance and stored energy.

(6 marks)

G 5505 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 406—COMPUTER PROGRAMMING [EE]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. List the categories the characters in C language are grouped into.
2. Explain exit-controlled loop with an example.
3. Write a C program using pointers to determine the length of a character string.
4. What is array of structures ? Give example.
5. Define a macro. Give example.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Write a C program that converts the given temperature in Fahrenheit to Celsius using the following conversion formula :

$$C = \frac{F - 32}{1.8}.$$

7. Write a C program to calculate the average of a set of N numbers using while loop.
8. What is recursion ? Write a C program to compute factorial of a given number using recursion.
9. What are self-referential structures ? Give example.
10. Write a C program to read data from the keyboard, write it into a file called INPUT, again read the same data from the INPUT file, and display it on the screen.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Write a C program to print the first 'N' prime numbers. (6 marks)

(b) Write a C program to perform computation of sin (x) as given below :

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} \ldots\ldots \text{ N terms.}$$

(6 marks)

Or

12. (a) Write a C program using nested if condition that will accept roll number, name and total mark obtained by a student and assign grades according to the following conditions, and display the roll number, name, total mark and grade :

Total Mark	Grade
> = 90	A
> = 80 and < 90	B
> = 70 and < 80	C
> = 60 and < 70	D
> = 50 and < 60	E
< 50	Fail

(6 marks)

(b) Write a C program using switch statement that will accepts a one character grade code of an employee and depending upon what grade code is input, display the basic pay of the employee according to the table given below :

Grade Code	Basic pay Rs.
A	15,000
B	12,000
C	10,000
D	80,000

(6 marks)

13. Write a C program to sort an array of 'N' numbers in ascending order.

Or

14. Write a C program to multiply two matrices.

15. What is a function ? Explain pass by value and pass by reference with an example.

Or

16. (a) Explain with an example pointers as function arguments. (8 marks)

(b) Write a C function using pointers to exchange the values stored in two locations in the memory. (4 marks)

17. (a) Define a structure called cricket that will describe the following information. Player name, Team Name and batting average. Using cricket, declare an array player with 50 elements and write a program to read the information about all the 50 players and print a team-wise list containing names of players with their batting average. (8 marks)

(b) How does a structure differ from an array ? Explain with an example. (4 marks)

Or

18. (a) What is dynamic memory allocation ? Explain memory allocation with malloc and calloc in C language with an example. (7 marks)

(b) What is a linked list ? Explain with diagrammatic illustration. (5 marks)

19. What is a file ? Explain with example the file handling functions.

Or

20. A file with name DATA contains a series of integer numbers. Write a C program to read these numbers and then write all odd numbers to a file called ODD and all even numbers to a file called EVEN.

[5 × 12 = 60 marks]

G 5543 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Electrical and Electronics Engineering

COMPUTER PROGRAMMING [E]

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C programs wherever needed.

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1 List the types of tokens C language has.

2 Explain goto statement in C language with an example.

3 Write a C program to calculate the average of a set of N numbers using while loop.

4 Write a C Program that will find Pythagorean triplets between 1 to 100. Pythagorean triplets are such that the square of one number is equal to the sum of the squares of the other two numbers.

Example : 3, 4, 5.

$5^2 = 3^2 + 4^2$.

$25 = 9 + 16$.

5 Explain the need for array variables.

6 List the string-handling functions in C language.

7 Write the general format for declaring and opening a file, and explain the same.

8 Write a C program using pointers to compute the sum of all elements stored in an array.

9 Consider a book database consisting of the following information : ISBN number, book name, author, number of pages and price. Define a structure book in C language to hold this information.

10 What is a nested structure ? Explain with a example.

[10 × 4 = 40 marks]

Part B

Answer **all** *question.*

Each full question carries 12 *marks.*

11 (a) What are enumeration variables ? How are they declared ? What are the advantages of using them in a C program ? Explain with an example.

(6 marks)

Turn over

(b) Write a C program to print the first 'N' prime numbers.

(6 marks)

Or

12 Explain with example if-else statement, nested if-else statement and switch statement in C language.

13 (a) Write a 'C' function exchange to interchange the values of two varibles, say x and y.

(6 marks)

(b) Write a 'C' function that will scan a character string passed as an argument and convert all lower-case characters to thier upper-case equivalents.

(6 marks)

Or

14 What does storage class refer to ? List and explain the differnt storage class specifications in C language with example.

15 Write a C program to multiply two matrices.

Or

16 (a) Write a C program to accept a string, reverse the string, check whether the string is a palindrome and print the result.

(6 marks)

Note : For example consider the string 'MALAYALAM' as an example for palindrome; when you reverse the string you get back the original string 'MALAYALAM'.

(b) Write a C program to accept a string, count the number of vowels in the string and print the result.

(6 marks)

17 Write a C function using pointers to sort an array of 'N' names alphabetically.

Or

18 What is a file ? Explain with example the file handling functions.

19 Explain structures and union in C language with example.

Or

20 (a) what is a linked list ? Explain with diagrammatic illustration.

(6 marks)

(b) Explain with example and diagrammatic illustration the process of adding nodes into a linked list and deleting nodes from a linked list.

(6 marks)

[5 × 12 = 60 marks]