

Instructions:

1. All symbols carry usual meanings.
2. Attempt all questions.
3. Scientific calculators are allowed

Q1 (A) Define Transfer function of a system.

How are poles and zeros of a transfer function defined?

The impulse response of a system is $(e^{-2t} \cos 3t)$. Find its transfer function. [7]

OR

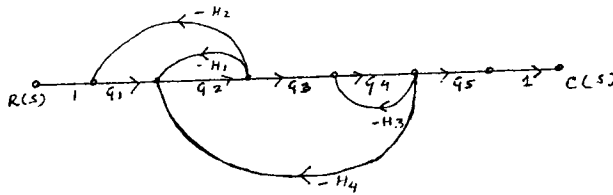
Q1 (A) Write a note on AC Servomotor. [7]

Q1 (B) List the advantages of analogous systems. Discuss Force-Current analogy. [7]

OR

Q1 (B) Write a descriptive note on stepper motor. [7]

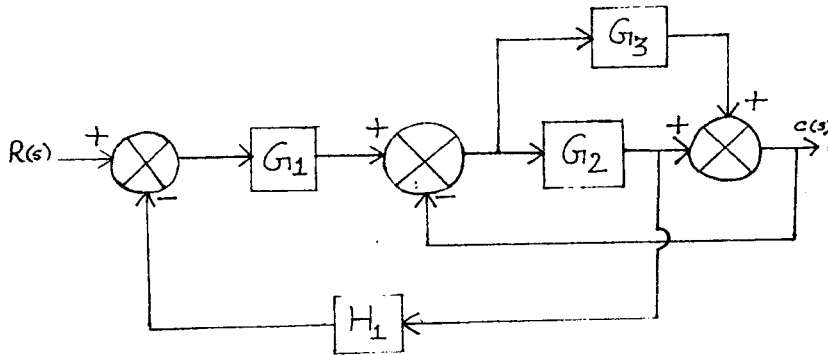
Q2 (A) Obtain the transfer function of the following Signal Flow Graph (SFG) using Mason's gain formula and also indicate the steps as applied. [7]



OR

(P.T.O)

Q 2(A) Reduce the following block diagram and obtain its transfer function. (indicating the rules as applied). [7]



Q2 (B) For second order system discuss the pole locations for different values of damping ratio (ξ). [7]

OR

Q2 (B) Discuss time response of second order system subjected to unit impulse input for over damped condition ($\xi > 1$). [7]

Q3(A). Write a program to read three numbers, call a function to calculate average of lowest and highest among them. Print the result from main() [7]

OR

Q3(A). Write a program to read two strings, call a function to append first string on the second string. Program also should find out length of the appended string. Print all three strings and length from main(); [7]

Q3(Bi). With help of examples distinguish between array, structure and union. [3]

(Bii). Define a structure with **hr, min and sec** as its members. Develop a program that should call a function to read time and another function to print the time. [4]

OR

Q3(B) Write a program to define a structure that should store name, age, branch and mark. Read details of 100 students and print a) average age of students b) details of all students in **electronics** branch c) details of the student having the highest mark. [7]

4(A). Develop a program to read radius from user. If the radius is more than five call a function to calculate perimeter and area of a circle otherwise call a function to calculate surface area and volume of a sphere. [7]

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OR

Q4(A). Write a program to read hundred values and store all positive values in a file and all negative numbers in another file. Program should find out and print sum of all values in the first file and product of all values in the second file [7]

Q4(Bi) What are preprocessors? Describe **any three** categories of preprocessors. [3]

(Bii) Write output of the following program segment [4]

```
int x = 3, y = 4, z = 5
for (i=2, j=3; i<4; i++, j--)
    printf("%d %d %d %d", i < 2, i << 2, j & 3, j && 3);
```

OR

Q4(Bi) With help of examples explain **bitwise** operators in C language. [3]

(Bii). Write a program to draw two circles with different colors at the center of the monitor. [4]

Q5 Answer the following (One mark each) [14]

- (i) State main requirements of a good control system ?
- (ii) Give two examples of closed loop control system.
- (iii) The Laplace transform of a ramp signal is _____
- (iv) What is meant by different **types** of systems?
- (v) If the transfer function is given by $G(s) = (s+1j) / (s+3)$, then what is the Position of Zero?
- (vi) State the rule for shifting the Take off point after the Block.
- (vii) What is the significance of damping ratio (ξ).
- (viii) What is meant by static variable?
- (ix) Write prototype of a function which receives a character value and an integer value and returns a float value.
- (x) What is the major difference between union and structure?
- (xi) What is a pointer ?
- (xii) Explain the following statement
double x = 20, *px = &x;
- (xiii) Mention any two advantages of using pointers
- (xiv) Distinguish between
if and #if statements

M.Sc. (Sem.-III) Examination

504 Electronics Science

May-2017

[Max. Marks : 70]

Time : 3 Hours]

- Instructions:** (1) Attempt All Questions. Max Marks 70.
 (2) All questions carry equal marks.
 (3) Symbols and terminology have their usual meanings.
 (4) Scientific calculator may be permitted.
- Q.1 (a) Explain the surface geometries and power frequency limitations of microwave bipolar transistor. [7]
OR
 (a) Explain tunnel diode characteristics with the aid of energy band diagram. [7]
 (b) Describe the physical structure and principle of operation of HEMT. What are its electronic applications? [7]
OR
 (b) Explain Gunn effect using two valley model theory. [7]
- Q.2 (a) Explain principle and construction of IMPATT diode. Describe mechanism of oscillations in IMPATT diode. [7]
OR
 (a) Write a detailed note on parametric amplifier. [7]
 (b) What are bolometers? Describe how can the power of a microwave generator be measured using bolometer? [7]
OR
 (b) Explain slotted line method of measuring impedance of a terminating load in a microwave system. [7]
- Q.3 (a) Discuss principles and theory of the strain gauges. Derive necessary expression for Gauge factor (G_f). [7]
OR
 (a) Discuss Temperature compensation circuits using (i) two active gauges in arm (ii) Four active gauges in arm [7]
 (b) Discuss Gauge sensitivity and derive necessary expression for it. Show that the output voltage from bridge is: $\Delta e_D = \frac{G_f \Delta \epsilon}{4} e_i$ [7]
OR
 (b) Draw relevant schematic of Load cell and Load cell strain gauge bridge. Discuss strain gauge circuitry with relevant diagram. [7]
- Q.4 (a) Draw the schematic and discuss working of basic thermal conductivity gas analyzer circuit. [7]
OR
 (a) List various electrical methods used to measure thickness and discuss any one in detail with relevant diagram. [7]
 (b) Discuss variable area and capacitive voltage divider methods to measure liquid level. [7]
OR
 (b) Draw relevant circuit of a hot wire anemometer and discuss how a rate of fluid is measured using it? [7]

[P.T.O.]

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Q.5 Answer following questions in brief (each question is of one mark). [14]

- (i) What do you understand by HBTS?
- (ii) In a Gunn diode with active length of $20 \mu\text{m}$ and drift velocity of electrons $2 \times 10^7 \text{ cm/sec}$, calculate the natural frequency of the diode.
- (iii) What is READ diode?
- (iv) What are the different modes of operation of a Gunn diode?
- (v) How a tunnel diode differs from an ordinary PN junction diode?
- (vi) Draw equivalent circuit of a MESFET device?
- (vii) Define VSWR?
- (viii) List various types of strain gauges
- (ix) Write two applications of strain gauges.
- (x) Write two applications of ultrasonic waves
- (xi) The gauge sensitivity (S_g) of Half bridge is _____
- (xii) Draw relevant schematic of Ballast Circuit
- (xiii) What is 'Dummy' gauge?
- (xiv) What do you understand by an active gauge?
