



# DADI INSTITUTE OF ENGINEERING & TECHNOLOGY

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## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

### QUESTION BANK (2017-2018 AY)

Subject: DIGITAL CONTROL SYSTEMS

Year/Sem : IV/ II

Faculty: Ms. A. Lakshmi Durga

REGULATION:R13

#### UNIT-1

- 1 a) Differentiate between the continuous and discrete time signals?
  - b) What is meant by zero order hold? Derive the transfer function of zero order hold device
- 2 a) What do you mean by periodic and aperiodic signals with neat sketch?
  - b) Differentiate between the linear time invariant and causal systems.
- 3 a) With suitable block diagram explain the general sampled data control system.
  - b) Explain any two examples of digital control systems
4. a) Explain the advantages and disadvantages of digital control systems.
  - b) State and explain the sampling theorem.
- 5 a) What are the advantages of sampling process in control system
  - b) Explain any two types of digital to analog converters with a neat sketch
- 6 a) with the help of diagram explain the successive approximation analog to digital converter
  - b) What are the advantages offered by digital control system

#### UNIT-2

- 1 a) Obtain the z - transform of the following  $x(k) = \sum_{h=0}^k a^h$  where a is a constant.
  - b) Obtain the inverse z-transform of the following

$$X(z) = \frac{z^{-1}(1-z^{-2})}{(1+z^{-2})^2}$$

- 2 a) Given the discrete time system

$$y(k) - \frac{1}{\sqrt{2}}y(k-1) + \frac{1}{4}Y(k-2) = u(k) + \frac{1}{3}u(k-2)$$

Determine the pulse transfer function.

- b) Solve for y(k) the equation

$$y(k) = r(k) - r(k-1) - Y(k-1), k \geq 0, r(k) = 1; k \text{ even} \ \& \ r(k) = 0; k \text{ odd}$$
$$y(-1) = r(-1) = 0$$

- 3 a) Obtain the inverse Z-transform of the following in the closed form.

$$F_1 = \frac{.368Z^2 + .478Z + .154}{Z^2(Z-1)}$$

- b)  $F_2 = \frac{Z+2}{Z^2(Z-2)}$



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4 a) State and prove the Shifting theorem and Complex translation theorem

b) Obtain the z-transform following:

(i)  $X(s) = \frac{1}{s^2(s+1)}$  (ii)  $f(t) = e^{-at} t^2$

5. a) What are the popular methods are used to find the inverse z-transform? Explain each of them.

b) Obtain the inverse z-transform of the following:

(i)  $F(z) = \frac{z^{-3}}{(1-z^{-1})(1-0.2z^{-1})}$  (ii)  $F(z) = \frac{z^{-1}(1-z^{-2})}{(1+z^{-2})^2}$

6. a) State and prove the following theorems of z-transforms.

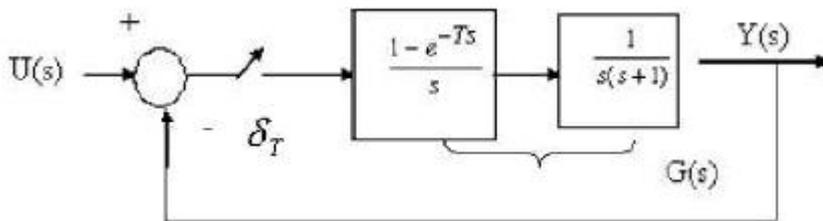
Initial value theorem and final value theorem.

b) Find the inverse z-transform of the following function ,

$$F(z) = \frac{z^2}{(z-1)(z-0.2)}$$

## UNIT-3

1a). Obtain a state space representation of the system shown below in figure



b) write about the state matrix of the above system?

2 a) Enumerate the methods for computation of state transition matrix.

b) Consider the discrete control system represented by the transfer function

$$G(z) = \frac{z^{-1}(1+z^{-1})}{(1+0.5z^{-1})(1-0.5z^{-1})}$$

Obtain the state space representation in the diagonal form.

3 a) Find state model for the following difference equation.

$$y(k+2)+3y(k+1)+2y(k)=5u(k+1)+3u(k)$$

b) find its state transition matrix

4 a) The pulse transfer function of digital control systems is given by

$$G(z) = \frac{5z}{z^2 + 3z + 2}$$

Find state model for the following difference equation.

b) ) find its state transition matrix

5 a). The pulse transfer function of a control system is given by



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$$\frac{Y(z)}{R(z)} = \frac{z^3 + 2z^2 + z + 2}{z^3 + 3z^2 + 2z + 1}$$

Obtain a state space representation for the system and draw the state diagram.

b) obtain the pulse transfer matrix.

6 a). Given the state equation  $X(k+1) = F X(k) + Gu(k)$ , where

$$F = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & -0.5 & 1.5 \end{bmatrix} \quad G = \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 2 & 1 \end{bmatrix}$$

Find the state transition matrix  $F(k)$  using (a) Cayley-Hamilton technique (b) Similarity transformation.

## UNIT-4

1 a) State and explain Jury's stability test.

b) Using Jury's stability criterion find the range of K, for which the characteristic equation  $z^3 + Kz^2 + 1.5Kz - (K+1) = 0$  is closed loop stable.

2a). Discuss how the stability analysis of discrete control system is done using Routh stability criteria

(b) discuss the stability analysis using Bilinear transformation.

3) Determine the stability of the following characteristic equation

a)  $z^3 - 0.2z^2 - 0.25z + 0.05 = 0$

b)  $z^4 - 1.7z^3 + 1.04z^2 - 0.268z + 0.024 = 0$

4 a) Define stable system ?

b) Explain the Mapping between S-plane and Z-plane

5 a) State the advantages of RH stability criterion over Hurwitz method

b) Write a short note on primary strips and complementary strips

## UNIT-5

1a) What is a lag compensation ? what can be achieved by this technique ?

b) Explain the design of lead lag controller in detail with suitable diagram?

2 a) Explain about the concept of constant damping ratio loci?

b) Explain the design of digital controllers through bilinear transformation

3a) Explain the steady-state error analysis of continuous - data control and discrete data control systems.

b) What is characteristic equation ? explain its significance?



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4a) Explain design procedure in the W-plane?

b) List the steps in designing root Locus?

5 a) State and explain transient response specifications

c) Discuss the review of phase lag, lead and lead-lead compensator

## UNIT-6

1 a) Control a system, defined by

$$\dot{X} = Ax + Bu$$

$$Y = Cx$$

$$\text{Where } A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 2 \end{bmatrix}, C = [1 \quad 0]$$

It is desired to have eigenvalues at -3.0 and -5.0 by using a state feedback control  $u = -KX$ . Determine the necessary feedback gain matrix  $k$

b) Find the control signal  $U$  for the above system?

2 a) Explain the procedure of designing a state feedback controller through pole placement.

b) Draw the block diagram of state feedback controller?

3a) List the advantages of feedback system?

b) Derive Ackerman's formula.

4 a) Discuss the necessary conditions for design of state feedback controller through pole placement?

b) Classify the feedback control methods?

5 a) Derive the sufficient condition for an arbitrary pole placement?

b) Explain the concept of state feedback controllers?



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## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

### QUESTION BANK (2017-2018 AY)

**Faculty: Mr. KRISHNA NAG**

**REGULATION: R13**

**Subject: FACTS**

**Year/Sem : IV/ II**

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### **UNIT - I**

- 1 a) What are the limitations for the loading capability of a transmission line? Explain. [5]  
b) How can the power flow controlled in mesh networks. [5]
- 2) a) “Injecting the voltage into transmission line perpendicular to the line current mostly changes the active power”. Justify with the help of phasor diagram. [5]  
b) What are the parameters of the transmission line that can be controlled to control the power flow? Explain the importance of these parameters. [5]
- 3) a) What is the need for transmission interconnections? Explain. [5]  
b) Discuss how power flow can be controlled in parallel paths.[5]
- 4) a) Explain the power flow in parallel circuits with FACTS.(5)  
b) What are the limits of the loading capability of lines? And only discuss with stability condition.(5)
- 5) a) Explain the dynamic stability considerations of a transmission interconnection with FACTS.(5)  
b) What is the relative importance of controllable parameters of the transmission system? (5)
- 6 a) What are the basic types of FACTS controllers? Discuss each one with diagram.(5)  
b) Explain the voltage and current rating of high power devices. (5)
- 7) a) Discuss the benefits of FACTS controllers.(5)  
b) Describe the parameters trade-off of high power devices. (5)

### **UNIT – II**

- 1a) Explain the operation of three phase full wave bridge converter with circuit diagram and waveforms. (5)  
b) Explain the operation of single phase full wave bridge converter with circuit diagram and waveforms. (5)



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2. a) Discuss the operation of three phase current source converter with circuit diagrams. (5)  
b) What are the merits and demerits of voltage source converter with compared to current source converter? (5)
- 3) a) With a neat circuit diagram, explain the basic operation of a voltage sourced converter. [5]  
b) What are the effects of harmonics? Prove that the fundamental RMS component of a square wave ac voltage for a single-phase bridge converter is 0.9 times the dc voltage. [5]
4. a) What are the opportunities of FACTS?(5)  
b) Explain the benefits from FACTS controllers. (5)
- 5) a) What are FACTS? Give the basic types of FACTS controllers. [5]  
b) Explain the characteristics of high power devices used in FACTS. [5]
- 6) a) What are the major issues in AC power transmission? Explain how they addressed using FACTS devices. [5]  
b) Classify different FACTS controllers. Explain them briefly. [5]

## UNIT – III

- 1) a) Explain the objective of reactive shunt compensation in transmission lines. [5]  
b) With phasor diagrams and power-angle characteristics, explain a two machinepower system with ideal midpoint reactive compensation. [5]
- 2) a) “For a radial line, the end of the line is the best location for compensator”. Justify. [5]  
b) Explain how midpoint voltage regulation helps in increasing the transmittable power of a line. [5]
- 3) a) What are the objectives of static shunt compensation? [5]  
b) Discuss the improvement of transient stability with midpoint voltage regulation. [5]
- 4) a) Illustrate the midpoint voltage regulation for line segment by using shunt compensation. (5)  
b) List out the objectives of shunt compensation. (5)
- 5) a) Discuss how to prevent voltage instability at the end of line by using shunt compensation. [5]  
b) Explain the power oscillation damping with shunt compensation. [5]
- 6) Explain the following with respect to shunt compensation
  - a) Mid-point voltage regulation. [5]
  - b) Transient stability. [5]
- 7) a) Discuss the basic concept of voltage sourced converter with circuit diagram.(5)  
b) Derive the square wave voltage harmonics for a single phase bridge. (5)
- 8) a) List different methods for controllable var generation. [5]  
b) Explain the operation of Thyristor-Controlled Reactor (TCR) with necessary waveforms. [5]



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## UNIT - IV

- 1) A) Discuss the operation of STATCOM. Draw their V-I operating characteristics. [5]  
B) Discuss the transient stability enhancement with STATCOM. [5]
- 2) a) Explain the operating V-I characteristics of SVC and STATCOM. [5]  
b) With a neat block diagram, explain the implementation of power oscillation damping by using static var generators. [5]
- 3) a) What is regulation droop? Explain its significance.[5]  
b) Draw and discuss the V-I characteristics of SVC. [5]
- 4) Describe the transfer function and dynamic performance of SVC and STATCOM with necessary diagrams. [10]
5. a) Draw the block diagram of VAr reserve control. [5]  
b) Briefly discuss the comparison between STATCOM and SVC with their characteristics. [5]
6. Describe the transient stability enhancement and power oscillation damping with SVC and STATCOM with necessary diagrams. [10]
- 7) With circuit diagram and waveforms, explain the operation of TCR and TSR.  
Draw their V-I characteristics. Also differentiate between them. [10]
- 8) a) Explain the operation of Thyristor-Switched Capacitor (TSC). [5]  
b) With circuit diagram and waveforms, explain the operation of Thyristor- Switched Reactor (TSR). [5]
- 9 a) Briefly discuss the basic control approach of switching converter type VAr generation. [5]  
b) Explain the hybrid generators. [5]
- 10) a) List out the methods of controllable VAr generation. [5]  
b) Discuss the basic operating principles of switching converter type VAr generator. [5]
- 11) Explain the i) thyristor-switched capacitor, ii) thyristor controlled reactor type VAr generator with circuit diagram and its characteristics. [10]

## UNIT – V

- 1) A) What are the objectives of series Compensation? (5)  
B) Explain the operation of GTO Thyristor Controlled Series capacitor? (5)
- 2) A) How the Voltage stability can be improved by using series Compensation? (5)



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- B) Explain the operation & working of Thyristor controlled Series Capacitor? (5)
- 3) A) Explain the operation & working of Thyristor switched Series Capacitor? (5)  
B) How the Power Oscillation damping can be reduced by using series compensation? (5)
- 4) A) Explain the improvement of Transient stability by using series compensation? (5)  
B) What are the basic control schemes for GCSC, TCSC & TSSC? (5)
- 5) A) Explain the operation of GTO Thyristor Controlled Series capacitor? (5)  
B) Explain the operation & working of Thyristor switched Series Capacitor? (5)
- 6) A) How the Voltage stability can be improved by using series Compensation? (5)  
B) Explain the operation & working of Thyristor switched Series Capacitor? (5)

## UNIT – VI

- 1) A) Explain the Basic operating principle of UPFC Controller? (5)  
B) Explain how the real & reactive power flow control can be done by using UPFC Controller? (5)
- 2) A) Compare the performance of UPFC with Series compensators? (5)  
B) Explain the Control structure of UPFC & basic function of shunt Converter? (5)
- 3) A) Explain with block diagram for P & Q Control by UPFC?(5)  
B) Explain the Basic operating principle of UPFC Controller? (5)
- 4) A) Explain the Basic operating principle of IPFC Controller? (5)  
B) Explain the Control structure of UPFC? (5)
- 5) A) Explain how the real & reactive power flow control can be done by using UPFC Controller? (5)  
B) Explain the Basic operating principle of IPFC Controller? (5)
- 6) A) Explain the Control structure of IPFC? (5)  
B) Compare the performance of UPFC with Controlled Phase angle regulators? (5)



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### QUESTION BANK (2017-2018 AY)

**Subject: SPECIAL ELECTRICAL MACHINES**

**Faculty: MR. G. JAGADEESH**

**REGULATION : R 13**

**Year/Sem : IV/ II**

#### UNIT – I

1. a) Define the terms pole arc and pole pitch. [5]  
b) What is the minimum stator and rotor pole arcs to achieve self starting of a switched reluctance motor? [5]
2. a) Discuss the variation of phase inductance of an SRM with its rotor position. [5]  
b) With a neat block diagram, explain the closed loop control of a S witched Reluctance motor. [5]
3. a) Derive the relationship between inductance and reluctance. [5]  
b) Derive the general expression for torque of a switched reluctance motor. [5]
4. a) Discuss the basic principle of Switched Reluctance Motors [5]  
b) Draw a three-phase asymmetric power converter used for switched reluctance motor and explain its operation. [5]
5. a) Draw and explain the torque-speed characteristics of a Switched Reluctance Motor. [5]  
b) Explain control principle of switched reluctance motor for fraction type loads [5]
6. a) What are the advantages and disadvantages of Switched reluctance motors and mention the applications of Switched reluctance motors [5]  
b) Explain the procedure in designing stator and rotor pole arc for switched reluctance motor. [5]
7. a) Explain different power converter configurations for Switched reluctance motor [5]  
b) Explain briefly design aspects of Switched reluctance motor [5]

#### UNIT – 2

1. a) Discuss different modes of excitation of stepper motors. [5]  
b) Draw and explain the power converter for stepper motors. [5]
2. a) What is a step angle? Explain. [5]  
b) Define stepping rate of a stepper motor. Calculate the stator pole pitch, rotor pole pitch and full step angle of a 12/8 Variable Reluctance stepper motor. [5]



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3. a) Explain open loop and closed loop control of stepper motor? Compare them? [5]  
b) What are hybrid stepper motors? Give its constructional details. [5]
4. a) Define the terms pull-in torque and pull-out torque of a stepper motor. [5]  
b) What is the main principle of operation of a stepper motor? Also list their applications. [5]
5. a) Describe constructional aspects of stepper motor [5]  
b) What are hybrid stepping motors? Explain. [5]
- 6a) Explain single stack and multi VR stepper motors. [5]  
6b) What is Bifilar winding? Explain its significance. [5]

## UNIT- 3

- 1a) Sketch the constructional details of a permanent magnet DC motor. [5]  
b) Derive the equivalent circuit of a permanent magnet DC motor. [5]
- 2 a) List the advantages and disadvantages of permanent magnet machines. [5] b) What is the need for commutator in DC machines? Explain its operation. [5]
- 3a) Give a detailed comparison between permanent magnet DC motors and conventional DC motors. [5]  
b) What is hysteresis loop? How permanent magnets can be selected for dc motors? [5]
- 4 a) Explain how torque generated in PMDC and derive its equation? [5]  
b) Why Permanent magnet machines have high torque /weight ratio? Explain clearly [5]
- 5 a) List out the reasons why Permanent materials used in DC Machines [5]  
b) Explain the significance of B-H characteristics of a permanent magnets [5]
- 6a) Explain about the moving coil motors? [5]  
b) Explain the performance characteristics of PMDC motors [5]

## UNIT- 4

- 1 a) What is a BLDC motor? Draw the back-emf waveforms and explain the switching logic for a three phase BLDC motors in two-phase switching mode. [5]  
b) With a neat block diagram, discuss the closed loop speed control of a BLDC motor drive. [5]
- 2 a) Differentiate between PMSM and BLDC motors. [5]  
b) Prove that the PM BLDC machines have 15% more power density than the PMSM [5]
- 3 a) What is the need for a speed controller?  
List different speed controllers suitable for BLDC motors. [5]  
b) What is the need for rotor position sensing in BLDC motors? Briefly explain. [5]



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- 4 a) Explain the use of hall sensors in the control of BLDC motors. [5]  
b) With a neat schematic diagram, explain the speed control of a BLDC motor drive. [5]
- 5 a) Give the advantages and application of BLDC motors[5]  
b) Explain the construction details of radial flux BLDC motor [5]
- 6 a) What are the advantages and disadvantages of Brushless DC machines compare to conventional DC motors. [5]  
b) Explain operating principle of Brushless DC motor with the help of diagrams. [5]
- 7 a) Explain sensoreless operation of brushless dc motor [5]  
b) Explain clearly the constructional details of brushless dc motor [5]

## UNIT- 5

- 1a) What are linear motors? Give their applications. [5]  
b) Explain construction & principle of operation of linear induction motor. [5]
- 2b) What are advantages & disadvantages of Linear Induction Motor compare to conventional induction motor and also list out the application of Linear Induction Motor [5]
- 3 a) What are different types of LIM? [5]  
Explain the operation of a short stator Linear Induction Motor [5]
- 4 a) What are different drives used in electric traction? Discuss. [7]  
b) Explain different types and applications of linear motor for electric traction [5]
- 5a) Explain the construction of linear synchronous motor [5]  
b) Explain the principle of operation of linear synchronous machine [5]
- 6a) what are the applications of linear synchronous machine [5]  
b) compare between LIM & LSM [5]

## UNIT-6

- 1 a) Give a detailed comparison between AC traction and DC traction. [5]  
b) List the main properties of a traction drive. [5]
- 2 a) Explain the advantages of AC traction over DC traction. [5]  
b) List and briefly explain different motors used in electric traction. [5]
- 3a) Why induction motors are being used in electric traction? Give their advantages and limitations. [5]  
b) Explain the constructional details of a single sided linear induction motor. [5]



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- 4a) Explain the operating principle of a single sided linear induction motor. [5]  
b) Discuss in detail the application of single sided linear induction motors for traction. [5]
- 5 a) What is the selection criterion of motors for electric traction application? Explain [5]  
b) What kind of ac motors is more suitable for traction application? Explain it clearly [5]
- 6a) What are the merits and demerits of ac traction motors compare to dc traction motors [5]  
b) Explain the construction and working principle of single sided linear induction motor [5]



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## DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

### QUESTION BANK (2017-2018 AY)

**Subject: UNIX & SHELL Programming**

**Year/Sem : IV/ II**

**Faculty: MR. V.SRINVAS, CSE**

**Regulation: R13**

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### UNIT I

1. a) What are the features of Unix operating system? (5 M)  
b) Explain the following Unix command with examples: echo, printf, who, wc, mkdir. (5 M)
2. a) Explain the unix kernel architecture(5 M)  
b) Explain the following unix commands(5 M)  
i) ssty            ii) cp            iii) tar            iv) printf
3. a) Draw the architecture of Unix and explain different components of it in detail(5 M)  
b) Explain the following command with Syntax and examples(5 M)  
i) echo            ii) passwd            iii) more            iv) od v) tar
4. a) Explain about UNIX features(5 M)  
b) Explain the following commands with suitable examples: (5 M)  
i) who            ii) date            iii) mkdir            iv) sty
5. a) Explain the following command with Syntax and examples(5 M)  
i) pwd            ii)ls            iii)wc            iv)cd  
b) Explain the following command with Syntax and examples(5 M)  
i) more            ii)lp            iii)mkdir            iv)date



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## Unit II

1. a) Explain various process utilities (5 M)  
b) Explain various disk utilities in Unix. (5 M)
2. a) Discuss about different modes of operation in vi editor. (5 M)  
b) Explain cut and paste commands with suitable examples(5 M)
3. a) How grep works? Explain with examples. (5 M)  
b) Why should we use multiple expressions in chmod? Explain with an example. (5 M)
4. a) Explain the following Unix commands(5 M)  
i) head          ii) tail          iii) nl
5. Explain the following Unix commands(5 M)  
i) comm          ii) cmp          iii) diff

## Unit III

- 1) Explain the following system calls(5 M)  
A) Create B) open C) close
- 2) Explain the following system calls(5 M)  
B) read B) write C) chmod
- 3) Explain the following system calls(5 M)  
A) stat B) fstat C) lstat
- 4) A) Explain Redirection? (5 M)  
B) Describe about Aliases(5 M)
- 5) a) What is a shell? Explain standard streams in unix (5 M)  
b) Explain tee command(5 M)



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## Unit IV

- 1) a) Differentiate between egrep() and fgrep().(5 M)  
b) Write a shell script to sort the content of a file. (5 M)
  
- 2) a) Write a program which use grep to search a file for a pattern and display the search patterns on the standard output. (5 M)  
b) How do locate lines beginning and ending with a dot using sed? Explain. (5 M)
  
- 3) a) What is a regular expression? Explain various types of grep (5 M)  
b) Write a grep(egrep) command that selects the lines from file1 that start with the string “UNIX” and end with the string “UNIX” (5 M)
  
- 4) a) Explain the concept of awk? Write about fields and records (5 M)  
b) Draw the standard awk script design? How can we use commands in awk script file? (5 M)
  
- 5) A) Explain how associative arrays are used in awk scripts (5 M)  
B) Explain in detail about the mathematical functions of AWK. (5 M)

## Unit V

- 1) Give the syntax of selection and repetition statements in korn shell. Explain them with example. (10 M)
- 2) A) List korn shell features and explain the command history of korn shell. (5 M)  
B) Explain about command execution process of korn shell. (5 M)
  
- 3) Write each of the following file expressions in Korn shell(5 M)  
A) file1 is empty B) file2 is not readable(5 M)
  
- 4) A) List korn shell features and explain the command history of korn shell. (5 M)  
B) Explain about command execution process of korn shell. (5 M)
  
- 5) A) What is the format for an instruction in korn shell? (5 M)  
B) Find the line that does not match a regular expression in korn using grep. (5 M)



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## Unit VI

- 1.a) Explain various environmental variables in C shell. (5 M)
- B) Explain about Argument Validation in C shell. (5 M)
  
- 2) A) Explain various Special Parameters and Variables in C shell programming. (5 M)
- B) Explain about Argument Validation in C shell. (5 M)
  
- 3 a) Describe about “eval” command in C Shell with an example. (5 M)
- b) Differentiate between the special files of C shell and korn shell. (5 M)
  
- 4) a) Write about on-off variables in interactive C shell (5 M)
- b) Write a shell script to display prime number from 1 to 100(5 M)
  
- 5) A) Explain various Special Parameters and Variables in C shell programming. (5 M)
- b) Write a short note on positional parameters in C shell. (5 M)