Note: “These are sample MCQs to indicate pattern, may or not appear in examination.”

Program: BE Computer Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code: CSC503 and Course Name: Computer Network

Time: 1hour Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	Which network topology requires a central hub?
Option A:	Star
Option B:	Mesh
Option C:	Bus
Option D:	Ring
Q2.	Who defines the Internet architecture?
Option A:	IETF
Option B:	IEEE
Option C:	ACM
Option D:	Springer
Q3.	In the layer hierarchy as the data packet moves from the upper layer to the lower layers, headers are _____
Option A:	Added
Option B:	Removed
Option C:	Rearranged
Option D:	Modified
Q4.	A Physical path over which a message travels are called?
Option A:	Path
Option B:	Medium
Option C:	Protocol
Option D:	Route
Q5.	_____ is the end device in computer network.
Option A:	Router
Option B:	NIC
Option C:	Transceiver
Option D:	Computer
Q6.	Protocol data unit (PDU) of transport layer is called
Option A:	Bit
Option B:	Frame

Option C:	Segment
Option D:	Packet
Q7.	The _____ noise is due to thermal agitation of electrons in a conductor.
Option A:	Intermodulation Noise
Option B:	Cross talk
Option C:	Impulse Noise
Option D:	Thermal Noise
Q8.	_____ devices can be connected using straight through cable.
Option A:	switch to switch
Option B:	router to router
Option C:	pc to pc
Option D:	pc to switch
Q9.	Shannon Capacity (Noisy Channel) is calculated using
Option A:	C = B log2 (1 + S/N)
Option B:	C = B log2 (1 - S/N)
Option C:	C = B log2 (1 + N/S)
Option D:	C = B log2 (S/N)
Q10.	ADSL offers speed up to _____ Mbps by dividing local loop into many virtual channels and modulating each one separately
Option A:	40
Option B:	60
Option C:	100
Option D:	50
Q11.	IEEE 802.11 is standard for
Option A:	Ethernet
Option B:	Bluetooth
Option C:	Broadband Wireless
Option D:	Wireless LANs
Q12.	Which of the following layers of the OSI reference model resolve problems of damaged or lost or duplicate frames?
Option A:	Data Link Layer
Option B:	Network Layer
Option C:	Session Layer
Option D:	Transport Layer
Q13.	The maximum throughput for pure ALOHA is _____ per cent.
Option A:	13.5
Option B:	18.4
Option C:	36.8

Option D:	20.5
Q14.	The message 11001001 is to be transmitted using the CRC polynomial x^3 + 1 to protect it from errors. The message that should be transmitted is:
Option A:	11001001000
Option B:	11001001011
Option C:	11001010
Option D:	110010010011
Q15.	The size of IPv6 is
Option A:	124 bits
Option B:	128 bits
Option C:	128 bytes
Option D:	32 bits
Q16.	Find the number of subnets and valid hosts per subnet for IP address with subnet mask 200.100.230.140/26.
Option A:	64 subnets and 4 hosts per subnets
Option B:	62 subnets and 4 hosts per subnets
Option C:	4 subnets and 64 hosts per subnets
Option D:	4 subnets and 62 hosts per subnets
Q17.	Which of the following is not a field in routing table?
Option A:	Mask
Option B:	Network address
Option C:	Flags
Option D:	Datagram subnet
Q18.	Identify the class of given IP address 10.5.5.1
Option A:	Class D
Option B:	Class B
Option C:	Class C
Option D:	Class A
Q19.	In UDP there is some loss of datagram because
Option A:	UDP sends each datagram only once
Option B:	The datagram tend to travel along different routes and tend to get lost
Option C:	Network devices give less priority to UDP datagram
Option D:	UDP doesn’t have a tracking and re-transmission mechanism
Q20.	TCP sequence number field is of
Option A:	8 bit
Option B:	16 bit
Option C:	24 bit
Option D:	32 bit

Q21.	What is congestion avoidance?
Option A:	Regulating sending rate based on network capacity
Option B:	Regulating receiving rate based on network capacity
Option C:	Regulating sending rate based on receiver's feedback
Option D:	Regulating receiving rate based on sender's feedback
Q22.	Which of the following are TCP Timers?
Option A:	retransmission, persistence, alive, time-wait
Option B:	retransmission, non persistence, keep alive, time-bound
Option C:	retransmission, persistence, keep alive, time-wait
Option D:	transmission, consistence, keep alive, time-wait
Q23.	DHCP (dynamic host configuration protocol) provides _____ to the client.
Option A:	IP address
Option B:	MAC address
Option C:	URL
Option D:	Port number
Q24.	_____protocol is used for pulling messages from a mail server.
Option A:	TCP
Option B:	POP3
Option C:	FTP
Option D:	TFTP
Q25.	DHCP client and servers on the same subnet communicate via _____
Option A:	UDP broadcast
Option B:	UDP unicast
Option C:	TCP broadcast
Option D:	TCP unicast

Program: BE Mechanical Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code: MEC503 and Course Name:Heat Transfer

Time: 1 hour Max. Marks: 50

2909_R16_Mech_V_MEC503_QP4

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Note to the students: - All the Questions are compulsory and carry equal marks.

Q1.	A radiator in a domestic heating system operates at a surface temperature of 60 degree Celsius. Calculate the heat flux in W/m^2 at the surface of the radiator if it behaves as a black body
Option A:	697.2
Option B:	786.9
Option C:	324.7
Option D:	592.1
Q2.	Heat transfer takes place according to which law?
Option A:	Newton's law of cooling
Option B:	Second law of thermodynamics
Option C:	Newton's second law of motion
Option D:	First law of thermodynamics
Q3.	Absorptivity and reflectivity of a perfect black body are respectively
Option A:	1 and 0
Option B:	0 and 1
Option C:	1 and ∞
Option D:	0 and 0.5
Q4.	**In case of heat flow by conduction for a cylindrical body with an internal heat source, the nature of temperature distribution is**
Option A:	Linear
Option B:	Hyperbolic
Option C:	Parabolic
Option D:	logarithmic
Q5.	**. If the body or element does not produce heat, then the general heat conduction equation which gives the temperature distribution and conduction heat flow in an isotropic solid reduces to** $(\partial T/\partial x^2) + (\partial T/\partial y^2) + (\partial T/\partial z^2) = (1/\alpha)(\partial T/\partial t)$ **this equation is known as**

Option A:	Laplace equation
Option B:	Fourier equation
Option C:	Poisson equation
Option D:	Binomial equation
Q6.	**In which mode of heat transfer, the Biot number is important?**
Option A:	Transient heat conduction
Option B:	Natural convection
Option C:	Forced convection
Option D:	Radiation
Q7.	**The Fourier number (defined as a.t/L2) is used in the analysis of problem involving heat transfer by**
Option A:	Forced convection
Option B:	Natural convection
Option C:	Transient conduction
Option D:	Steady state conduction
Q8.	For a Lumped capacitance model in unsteady heat transfer
Option A:	The internal Temperature gradient (ITG) must be 0
Option B:	The internal Temperature gradient (ITG) must be greater than 0
Option C:	The internal Temperature gradient (ITG) must be less than 0
Option D:	There is no such model
Q9.	The Temperature distribution for an infinite length fin is given as , where the symbols have their usual meaning
Option A:	$\theta(x) = \theta_b e^{-(mx)}$
Option B:	$\theta(x) = \theta_b e^{-(x)}$
Option C:	$\theta(x) = \theta_b$
Option D:	$\theta(x) = \theta_b e^{-(mx^2)}$
Q10.	In order to measure temperature of a fluid flowing in a pipe a cylindrical fitting is used in which the measurement instrumentation is used, is known as
Option A:	Expansion
Option B:	T Joint
Option C:	Thermowell
Option D:	Multimeter
Q11.	Time constant for a thermocouple is given as
Option A:	$\tau = \frac{\rho.V.C}{h.A_s}$

Option B:	$\tau = \frac{\rho}{h.A_s}$
Option C:	$\tau = \frac{VC}{h.A_s}$
Option D:	$\tau = \frac{C}{h.A_s}$
Q12.	The flow is said to be turbulent flow in which the fluid particles move
Option A:	Well defined paths
Option B:	stream lines
Option C:	Zig – Zag way
Option D:	Both zig – zag and steam lined motion.
Q13.	The Grashof number in natural convection plays same role as
Option A:	Prandtl number (Pr) in forced convection
Option B:	Reynolds number (Re) in forced convection
Option C:	Nusselt number (Nu) in forced convection
Option D:	Peclet number (Pe) in forced convection
Q14.	Fraction of radiative energy leaving one surface that strikes the other surface is called?
Option A:	Radiative flux
Option B:	Emissive power of first surface
Option C:	View factor
Option D:	Reradiating flux
Q15.	The emissivity for a black body is?
Option A:	0
Option B:	0.5
Option C:	1
Option D:	0.75
Q16.	Two radiating surface A_1=6 m^2 and A_2=4 m^2 have the shape factor F_{1-2}=0.1; the shape factor F_{2-1}?
Option A:	0.18
Option B:	0.15
Option C:	0.12
Option D:	0.10
Q17.	What is the the shape factor of a hemispherical body placed on flat surface with respect to itself?
Option A:	zero
Option B:	0.25

Option C:	0.5
Option D:	1
Q18.	Stefen Boltzmann law is applicable to?
Option A:	Grey body
Option B:	White body
Option C:	Black body
Option D:	Opaque body
Q19.	According to Stefan Boltzmann the total radiations from a black body per second per unit area is proportional to?
Option A:	T
Option B:	T^2
Option C:	T^3
Option D:	T^4
Q20.	The total radiation leaving a surface per unit time per unit surface area is called as?
Option A:	Radiosity
Option B:	Irradiosity
Option C:	Irradiation
Option D:	Reflection
Q21.	In the film established along a vertical plate during condensation of any vapour over the plates, the temperature distribution curve is
Option A:	Concave upwards
Option B:	Concave downwards
Option C:	Parabolic
Option D:	Straight line
Q22.	A Counter flow heat exchanger is used to heat water from 20^0C to 80^0C by using hot exhaust gas entering at 140^0C & leaving at 80^0C. the log mean temperature difference for the heat exchanger is
Option A:	80^0C
Option B:	60^0C
Option C:	110^0 C
Option D:	not determinable as zero / zero is involved
Q23.	A designer chooses the values of fluid flow ranges and specific heats in such a manner that the heat capacities of the two fluids are equal. A hot fluid enters the counter flow heat exchanger at 100^0C and leaves at 60^0C, The cold fluid enters the heat Exchanger at 40^0C. The mean temperature difference between the two fluids is
Option A:	(100 + 60 + 40) / 3 ^{0}C
Option B:	60^0C
Option C:	40^0C
Option D:	20^0C

Q24.	The engine oil at 150^0C is cooled to 80^0C in a parallel flow heat exchanger by water entering at 25^0C and leaving at 60^0C. The number of transfer units (NTU) will be
Option A:	1
Option B:	1.2
Option C:	1.6
Option D:	2.0
Q25.	The average temperature difference between the two fluids in case of counterflow heat exchanger as compared to parallel flow heat exchanger is
Option A:	more
Option B:	less
Option C:	same
Option D:	unpredictable

Program: BE Electronics and Telecommunication Engineering

Curriculum Scheme: Revised **2016**

Examination: Third Year Semester **V**

Course Code and Course Name: **ECC503 Electromagnetic Engineering**

Time: **1 hour** Max. Marks: **50**

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Note to the students:- All Questions are compulsory and carry equal marks .

Q1.	The electric flux density **D** is the product of
Option A:	permittivity and flux lines
Option B:	permittivity and electric field intensity
Option C:	flux lines and electric field intensity
Option D:	permeability and electric field intensity
Q2.	Using Gauss's law as reference we can derive
Option A:	Coulomb's law
Option B:	Faraday's law
Option C:	Ohm's Law
Option D:	Ampere law
Q3.	Which is an example of convection current?
Option A:	Electric current flowing in a copper wire
Option B:	An electron beam in a television tube
Option C:	Electric current flowing in a coaxial cable
Option D:	Current flowing through conducting sheet
Q4.	Electric field in the ideal conducting medium is
Option A:	Infinite
Option B:	Zero
Option C:	Non linear
Option D:	linear
Q5.	The point form of Ampere law is given by
Option A:	Curl(**B**) = I
Option B:	Curl(**D**) = J
Option C:	Curl(V) = I
Option D:	Curl(**H**) = J
Q6.	The value of ∫ **H**.dL will be
Option A:	J
Option B:	I

Option C:	**B**
Option D:	**H**
Q7.	The characteristic impedance of free space is
Option A:	489
Option B:	265
Option C:	192
Option D:	377
Q8.	For a dielectric, the condition to be satisfied is
Option A:	$\sigma/\omega\varepsilon > 1$
Option B:	$\sigma/\omega\varepsilon < 1$
Option C:	$\sigma = \omega\varepsilon$
Option D:	$\omega\varepsilon = 1$
Q9.	According to Smith diagram, where should be the position of reflection coefficient value for a unity circle with unity radius?
Option A:	On or inside the circle
Option B:	Outside the circle
Option C:	At the origin
Option D:	At Infinity
Q10.	The open wire transmission line consists of
Option A:	Conductor and Dielectric
Option B:	Piezoelectric material
Option C:	Paramagnetic material
Option D:	Ferromagnetic material
Q11.	For a transmission line with a propagation constant 0.650 + j2.55, what is the value of phase velocity for 1 kHz frequency
Option A:	1.18×10^3 km/sec
Option B:	1.5×10^3 km/sec
Option C:	2.46×10^3 km/sec
Option D:	4.58×10^3 km/sec
Q12.	Graphene is the name for
Option A:	Honeycomb sheet of carbon atoms
Option B:	Nanoscale cube of carbon atoms
Option C:	An invisible plastic membrane
Option D:	Scientific name for graphite in 6B pencil
Q13.	A dielectric material having _____ dielectric constant is favored for capacitor.
Option A:	low
Option B:	high
Option C:	zero

Option D:	negative
Q14.	If the radius of a sphere r is 1/(4π) m (one over four times pi) and the electric flux density **D** is 8π (eight times pi) units, the total flux is given by
Option A:	0 units
Option B:	1 units
Option C:	2 units
Option D:	4 units
Q15.	Electric flux density present on the surface of conductor-free space boundary is due to
Option A:	Free charge present in the free space
Option B:	Charge density on the interface
Option C:	Water particles in the free space
Option D:	Pressure in the free space
Q16.	The divergence of which quantity will be zero?
Option A:	**E**
Option B:	**D**
Option C:	**H**
Option D:	**B**
Q17.	The relation between energy transfer and the electric and magnetic fields specified by
Option A:	Poynting theorem
Option B:	Stoke's theorem
Option C:	Helmholtz theorem
Option D:	Lagrange's theorem
Q18.	Find the curl of E when B is given as 15t.
Option A:	15
Option B:	-15
Option C:	7.5
Option D:	-7.5
Q19.	Which transmission line is called as one to one transformer?
Option A:	λ
Option B:	λ /4
Option C:	λ /2
Option D:	λ /8
Q20.	What is the Standing wave ratio if a 75Ω antenna load is connected to a 50Ω transmission line?
Option A:	1
Option B:	2
Option C:	1.5

Option D:	1.43
Q21.	The flux density of line charge of radius 5m (five meters) with a Gaussian surface cylinder and line charge density of π (pi) units is given by
Option A:	0.1 units
Option B:	0.25 units
Option C:	0.5 units
Option D:	0.75 units
Q22.	A parallel-plate capacitor connected to a battery stores twice as much charge with a given dielectric as it does with air as dielectric, the susceptibility of the dielectric is
Option A:	0
Option B:	1
Option C:	2
Option D:	3
Q23.	When the conduction current density and displacement current density are same, the dissipation factor will be
Option A:	Zero
Option B:	Minimum
Option C:	Maximum
Option D:	Unity
Q24.	A plane wave is travelling in the positive X- direction in a lossless unbounded medium having permeability the same as the free space and a permittivity 9 times that of the free space, the phase velocity of the wave will be
Option A:	3×10^8 m/s
Option B:	10^8 m/s
Option C:	$(1/3) \times 10^8$ m/s
Option D:	$\sqrt{3} \times 10^8$ m/s
Q25.	The propagation constant of a transmission line with impedance and admittance 9 and 16 respectively is
Option A:	25
Option B:	144
Option C:	12
Option D:	7

Program: BE Information Technology

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code: ITC503

Course Name: Advanced Data Management Technologies

Time: 1 hour Max. Marks: 50

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Note to the students:- All the Questions are compulsory and carry equal marks .

Q1.	The Evaluation technique in which the results of each intermediate operation are created and then are used for evaluation of the next-level operations. _____
Option A:	Tree materialization
Option B:	Expression evaluation
Option C:	Tree evaluation
Option D:	Materialized evaluation
Q2.	If the state of the database no longer reflects a real state of the world that the database is supposed to capture, then such a state is called
Option A:	Consistent state
Option B:	Parallel state
Option C:	Durable state
Option D:	Inconsistent state
Q3.	Consider a schedule S which can be transformed into a schedule S' by a series of swaps of non-conflicting instructions, then both S and S' are
Option A:	Non conflict equivalent
Option B:	Equal
Option C:	Isolation equivalent
Option D:	Conflict equivalent
Q4.	The property of a transaction that persists all the crashes is

Option A:	Atomicity
Option B:	Durability
Option C:	Isolation
Option D:	Consistency
Q5.	The phenomenon in which one failure leads to a series of transaction rollbacks is called as _____
Option A:	Cascading rollback
Option B:	Cascadeless rollback
Option C:	Cascade cause rollback
Option D:	Cascade fact rollback
Q6.	If a schedule is equivalent to a serial schedule, it is called as a _____
Option A:	Serializable schedule
Option B:	Committed schedule
Option C:	Final schedule
Option D:	Initial schedule
Q7.	The form of data having an associated data related to geographical location, is called as
Option A:	Temporal data
Option B:	Mobile data
Option C:	Spatial data
Option D:	Snapshot data
Q8.	What is the role of term Cascade in revoking the privileges?
Option A:	Not for all grants
Option B:	For all grants
Option C:	Not for every grant
Option D:	For only single grant

Q9.	The Transparency that enables multiple instances of resources to be used is called as :
Option A:	Replication Transparency
Option B:	Scaling Transparency
Option C:	Concurrency Transparency
Option D:	Performance Transparency
Q10.	A(n) _____ is a database stored on multiple computers in multiple locations that are NOT connected by a data communications link
Option A:	Distributed database
Option B:	Decentralized database
Option C:	Unlinked database
Option D:	Data repository
Q11.	Data that can be modelled as dimension attributes and measure attributes are called _____ data.
Option A:	Multidimensional
Option B:	Single dimensional
Option C:	Measured
Option D:	Dimensional
Q12.	The star schema is composed of_____fact table.
Option A:	One
Option B:	Two
Option C:	Three
Option D:	Four
Q13.	What does the acronym ETL stands for?

Option A:	Extract, Transfer and Load
Option B:	Explain, Transfer and Lead
Option C:	Effect, Transfer and Load
Option D:	Extract, Transform and Load
Q14.	Degree of Merging in external Sorting refers to
Option A:	Number of runs in iterations to complete the merge phase
Option B:	Number of runs that can be merged in each pass of merge phase
Option C:	Number of runs required to complete the merge phase
Option D:	Number of passes required to complete the merge phase
Q15.	Wait-die , wound-wait are deadlock_____ strategy
Option A:	Prevention
Option B:	Detection
Option C:	Recovery
Option D:	Rollback
Q16.	Which of the following protocols ensures conflict serializability and safety from deadlocks?
Option A:	Two-phase locking protocol
Option B:	Time-stamp ordering protocol
Option C:	Graph based protocol
Option D:	Dice based protocol
Q17.	Security mechanism used to grant and revoke privileges is referred as
Option A:	Mandatory security mechanism
Option B:	Roll based mechanism
Option C:	Discretionary security mechanism
Option D:	Database audit mechanism

Q18.	A fragmentation technique wherein every tuple of a table is assigned to one or more fragments as a result of fragmentation is called
Option A:	Vertical Fragmentation
Option B:	Horizontal Fragmentation
Option C:	Hybrid Fragmentation
Option D:	Derived Horizontal Fragmentation
Q19.	Which of the following is not a promise of distributed database?
Option A:	Network Transparency
Option B:	Replication Transparency
Option C:	Fragmentation Transparency
Option D:	Naming Transparency
Q20.	_____is a good alternative to the star schema.
Option A:	Star schema
Option B:	Snowflake schema
Option C:	Fact constellation
Option D:	Star-snowflake schema
Q21.	Channel which allows a transfer of information that violates the security
Option A:	Encrypted channel
Option B:	Covert channel
Option C:	Storage channel
Option D:	Timing Channel
Q22.	The organization of distributed database can be investigated along with
Option A:	Level of sharing
Option B:	Access pattern

Option C:	Level of knowledge
Option D:	pattern behavior
Q23.	_____operation of OLAP provides alternate presentation of data by rotating it.
Option A:	Slice
Option B:	Roll up
Option C:	Dice
Option D:	Pivot
Q24.	Which one of the following is not the Data Loading Mode?
Option A:	APPEND
Option B:	UPDATE
Option C:	LOAD
Option D:	DESTRUCTIVE AND CONSTRUCTIVE MERGE
Q25.	Capturing data based on Date/Time stamps or by comparing files is known as?
Option A:	Immediate Data Extraction
Option B:	Deferred Data Extraction
Option C:	Logical Data extraction
Option D:	Incremental Data Extraction

Program: BE Instrumentation Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code and Course Name: ISC503 : Control System Design

Time: 1hour Max. Marks: 50

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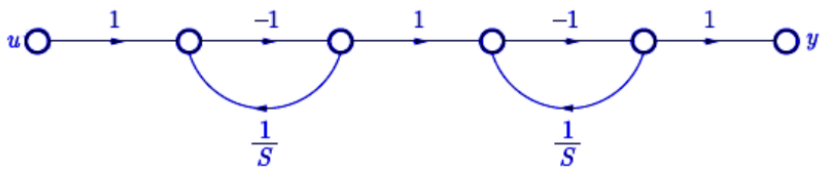
Note to the students:- All Questions are compulsory and carry equal marks .

Q1.	The value of dominant pole S_d is given by
Option A:	$S_d = -\xi\omega_n \pm j\omega_n\sqrt{(1-\xi^2)}$
Option B:	$S_d = -\xi^2{\omega_n}^2 \pm j{\omega_n}^2\sqrt{(1-\xi^2)}$
Option C:	$S_d = -\sqrt{\xi\omega_n} \pm j\omega_n\sqrt{(1-\xi^2)}$
Option D:	$S_d = -\xi^4{\omega_n}^4 \pm j{\omega_n}^4\sqrt{(1-\xi^2)}$
Q2.	The Lead-compensator has a
Option A:	Zero nearer to the origin
Option B:	Pole nearer to the origin
Option C:	Pole at the origin
Option D:	Zero at the origin
Q3.	Performance of a control system can be described in terms of
Option A:	Time-domain performance measures and not frequency-domain performance measures
Option B:	Frequency-domain performance measures and not time-domain performance measures
Option C:	Time-domain performance measures or frequency-domain performance measures
Option D:	Only time-domain performance measures.
Q4.	The Lag-compensator has a
Option A:	Zero nearer to the origin
Option B:	Pole nearer to the origin
Option C:	Pole at the origin
Option D:	Zero at the origin
Q5.	In frequency response approach, compensation network is used to alter and reshape the system's characteristics represented on an
Option A:	S-plane
Option B:	Root locus diagram
Option C:	Polar graph

Option D:	Bode plot
Q6.	The minimum number of states require to describe the second order differential equation is:
Option A:	1
Option B:	2
Option C:	3
Option D:	4
Q7.	Given the matrix $\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$ the Eigen values are_____
Option A:	1
Option B:	1, 2, 3
Option C:	0
Option D:	-1, -2, -3
Q8.	For a system with the transfer function $H(s) = \frac{s^3 + 8s^2 + 17s + 9}{s^3 + 6s^2 + 11s + 6}$ The state model in the 1st companion form is given by the matrices,
Option A:	A = $\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$ $B = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ $C = [9 \quad 17 \quad 8]$
Option B:	A = $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -6 & -11 & -6 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ $C = [8 \quad 17 \quad 9]$
Option C:	A = $\begin{bmatrix} 0 & 1 & 0 \\ -6 & -11 & -6 \\ 0 & 0 & 1 \end{bmatrix}$ $B = [8 \quad 17 \quad 8]$ $C = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$
Option D:	A = $\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ $C = [9 \quad 17 \quad 8]$
Q9.	The state diagram of the system is shown in figure. A system is described by state variable equations: $\dot{x} = Ax + Bu$ and $y = Cx + Du$  So, the state variable equations of the system given in figure are given by,
Option A:	$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} -1 \\ 1 \end{bmatrix} u$

	y = $[1 \quad -1]\begin{bmatrix}x_1\\x_2\end{bmatrix}$ + u
Option B:	$\begin{bmatrix}\dot{x_1}\\\dot{x_2}\end{bmatrix} = \begin{bmatrix}-1 & 0\\-1 & -1\end{bmatrix}\begin{bmatrix}x_1\\x_2\end{bmatrix} + \begin{bmatrix}-1\\-1\end{bmatrix}u$ y = $[-11 \quad -1]\begin{bmatrix}x_1\\x_2\end{bmatrix}$ + u
Option C:	$\begin{bmatrix}\dot{x_1}\\\dot{x_2}\end{bmatrix} = \begin{bmatrix}-1 & 0\\-1 & -1\end{bmatrix}\begin{bmatrix}x_1\\x_2\end{bmatrix} + \begin{bmatrix}-1\\1\end{bmatrix}u$ y = $[-1 \quad -1]\begin{bmatrix}x_1\\x_2\end{bmatrix}$ – u
Option D:	$\begin{bmatrix}\dot{x_1}\\\dot{x_2}\end{bmatrix} = \begin{bmatrix}-1 & -1\\0 & -1\end{bmatrix}\begin{bmatrix}x_1\\x_2\end{bmatrix} + \begin{bmatrix}-1\\1\end{bmatrix}u$ y = $[1 \quad -1]\begin{bmatrix}x_1\\x_2\end{bmatrix}$ – u
Q10.	Which of the following is correct with respect to the properties of the state transition matrix, $\emptyset(t)$?
Option A:	It is never singular
Option B:	It is non-continuous
Option C:	It does not have continuous derivatives
Option D:	$\emptyset(t,t) = -I \quad for\ all\ t$
Q11.	The system is said to be completely _____ if every state $x(t_0)$ can be determined from the observation of y(t) over a finite time interval.
Option A:	Controllable
Option B:	Observable
Option C:	Cannot be determined
Option D:	Controllable and observable
Q12.	For the system, $\dot{x} = \begin{bmatrix}-2 & 0\\0 & -1\end{bmatrix}x + \begin{bmatrix}3\\1\end{bmatrix}u$; which of the following statements is true?
Option A:	The system is controllable but unstable
Option B:	The system is uncontrollable and unstable
Option C:	The system is uncontrollable and stable
Option D:	The system is controllable and stable
Q13.	Consider the systems given by System 1: - $\dot{x} = \begin{bmatrix}-1 & 0\\0 & -2\end{bmatrix}x\ ; y = [1 \quad 3]x$ System 2: -$\dot{x} = \begin{bmatrix}-1 & 0\\0 & -2\end{bmatrix}x\ ; y = [0 \quad 1]x$
Option A:	System 1 & system 2 both are observable
Option B:	System 1 is not completely state observable but System 2 is completely state observable

Option C:	System 1 is completely state observable but System 2 is not completely state observable
Option D:	System 1 & system 2 both are not observable
Q14.	The system is represented by $\dot{x} = Ax + Bu$ where $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 0 \\ 1 & -4 & 3 \end{bmatrix}$; $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ And desired poles are $s = -10, s = -2 \pm j4$ Find state feedback gain matrix K as $u = -Kx$.
Option A:	$K = [199 \quad 55 \quad 8]$
Option B:	$K = [1 \quad -6 \quad 31]$
Option C:	System is not controllable so system cannot be stabilized by any K using state feedback control.
Option D:	System is not observable so system cannot be stabilized by any K using state feedback control.
Q15.	Transformation Approach to Obtain State Observer Gain Matrix Ke is given as
Option A:	$K_e = \left(\begin{bmatrix} a_{n-1} & a_{n-2} \dots a_1 & 1 \\ a_{n-2} & a_{n-3} \dots 1 & 0 \\ \vdots & \vdots \dots \vdots & \vdots \\ a_1 & 1 \dots 0 & 0 \\ 1 & 0 \dots 0 & 0 \end{bmatrix} [C^* \mid A^*C^* \mid \dots \mid (A^*)^{n-1}C^*] \right) \begin{bmatrix} \alpha_n - a_n \\ \alpha_{n-1} - a_{n-1} \\ \vdots \\ \alpha_1 - a_1 \end{bmatrix}$
Option B:	$K_e = \left(\begin{bmatrix} a_{n-1} & a_{n-2} \dots a_1 & 1 \\ a_{n-2} & a_{n-3} \dots 1 & 0 \\ \vdots & \vdots \dots \vdots & \vdots \\ a_1 & 1 \dots 0 & 0 \\ 1 & 0 \dots 0 & 0 \end{bmatrix} [C^* \mid A^*C^* \mid \dots \mid (A^*)^{n-1}C^*] \right)^{-1} \begin{bmatrix} \alpha_n - a_n \\ \alpha_{n-1} - a_{n-1} \\ \vdots \\ \alpha_1 - a_1 \end{bmatrix}$
Option C:	$K_e = \begin{bmatrix} \alpha_n - a_n \\ \alpha_{n-1} - a_{n-1} \\ \vdots \\ \alpha_1 - a_1 \end{bmatrix} \left(\begin{bmatrix} a_{n-1} & a_{n-2} \dots a_1 & 1 \\ a_{n-2} & a_{n-3} \dots 1 & 0 \\ \vdots & \vdots \dots \vdots & \vdots \\ a_1 & 1 \dots 0 & 0 \\ 1 & 0 \dots 0 & 0 \end{bmatrix} [C^* \mid A^*C^* \mid \dots \mid (A^*)^{n-1}C^*] \right)^{-1}$
Option D:	$K_e = \begin{bmatrix} \alpha_n - a_n \\ \alpha_{n-1} - a_{n-1} \\ \vdots \\ \alpha_1 - a_1 \end{bmatrix} \left(\begin{bmatrix} a_{n-1} & a_{n-2} \dots a_1 & 1 \\ a_{n-2} & a_{n-3} \dots 1 & 0 \\ \vdots & \vdots \dots \vdots & \vdots \\ a_1 & 1 \dots 0 & 0 \\ 1 & 0 \dots 0 & 0 \end{bmatrix} [C^* \mid A^*C^* \mid \dots \mid (A^*)^{n-1}C^*] \right)$
Q16.	The compensator G(s) =5(1+0.3s)/(1+0.1s) would provide a maximum phase shift of:
Option A:	20^0
Option B:	45^0
Option C:	60^0
Option D:	30^0
Q17.	Bode plot are preferred for compensation when the specifications are in terms of …… and …….
Option A:	phase margin, settling time
Option B:	phase margin, bandwidth

Option C:	phase margin, maximum overshoot
Option D:	Resonant peak, bandwidth
Q18.	In a frequency domain design of a lead compensator, the alpha parameter is calculated as -
Option A:	$\alpha = (1 - \sin\phi_m)/(1+\sin\phi_m)$
Option B:	$\alpha = (1 + \sin\phi_m)/(1+\sin\phi_m)$
Option C:	$\alpha = (1 + \sin\phi_m)/(1-\sin\phi_m)$
Option D:	$\alpha = (1 - \sin\phi_m)/(1-\sin\phi_m)$
Q19.	Derivative error compensation:
Option A:	Improvement in transient response
Option B:	Reduction in steady state error
Option C:	Reduction is settling time
Option D:	Increase in damping constant
Q20.	According to Ziegler-Nichols second method of tuning of PID controller –
Option A:	$K_P = 0.16Kcr$, $T_I = 0.05Pcr$, $T_D = 0.125Pcr$
Option B:	$K_P = 0.6Kcr$, $T_I = 0.55Pcr$, $T_D = 0.0125Pcr$
Option C:	$K_P = 0.6Kcr$, $T_I = 0.5Pcr$, $T_D = 0.125Pcr$
Option D:	$K_P = 0.65Kcr$, $T_I = 0.05Pcr$, $T_D = 0.125Pcr$
Q21.	If $\dot{x} = \begin{pmatrix} -1 & 0 \\ 0 & -2 \end{pmatrix} x$ and $x(0) = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$, then which one of the following is the solution $x(t)$?
Option A:	$x(t) = \begin{pmatrix} 2e^{-t} \\ e^{-2t} \end{pmatrix}$
Option B:	$x(t) = \begin{pmatrix} e^{-t} \\ 2e^{-2t} \end{pmatrix}$
Option C:	$x(t) = \begin{pmatrix} 2e^{-2t} \\ e^{-t} \end{pmatrix}$
Option D:	$x(t) = \begin{pmatrix} e^{-2t} \\ e^{-t} \end{pmatrix}$
Q22.	If $\dot{x} = \alpha x + \beta u$ with $x(0) = x_0$ then which one of the following is the solution $x(t)$?
Option A:	$x(t) = e^{\alpha t}x_0 + \int_0^t e^{\alpha(t-\tau)}\beta u(\tau)d\tau$
Option B:	$x(t) = e^{\alpha t}x_0 + \int_0^t e^{\beta(t-\tau)}\alpha u(\tau)d\tau$
Option C:	$x(t) = e^{\beta t}x_0 + \int_0^t e^{\beta(t-\tau)}\alpha u(\tau)d\tau$
Option D:	$x(t) = e^{\alpha t}x_0 + \int_0^t e^{\beta(t-\tau)}u(\tau)d\tau$

Q23.	If k is the dc gain of the system and r is the ratio of time constant τ and time delay θ, then Cohen-Coon tuning parameters k_p, τ_i and τ_d for PID controller are
Option A:	$k_p = \frac{r\left(1.33+\frac{1}{4r}\right)}{k}$, $\tau_i = \frac{40}{11+\frac{2}{r}}$ and $\tau_d = \frac{\theta\left(32+\frac{6}{r}\right)}{13+\frac{8}{r}}$
Option B:	$k_p = \frac{r\left(1.33+\frac{1}{4r}\right)}{k}$, $\tau_i = \frac{\theta\left(32+\frac{6}{r}\right)}{13+\frac{8}{r}}$ and $\tau_d = \frac{40}{11+\frac{2}{r}}$
Option C:	$k_p = \frac{k\left(1.33+\frac{1}{4r}\right)}{r}$, $\tau_i = \frac{\theta\left(32+\frac{6}{r}\right)}{13+\frac{8}{r}}$ and $\tau_d = \frac{40}{11+\frac{2}{r}}$
Option D:	$k_p = \frac{k\left(1.33+\frac{1}{4r}\right)}{r}$, $\tau_i = \frac{40}{11+\frac{2}{r}}$ and $\tau_d = \frac{\theta\left(32+\frac{6}{r}\right)}{13+\frac{8}{r}}$
Q24.	If system is a first order delay process $\frac{ke^{-\theta s}}{\tau s+1}$, then Ziegler-Nichols tuning parameters k_p and τ_i for PI controller are
Option A:	$k_p = \frac{0.9\theta}{k\tau}$ and $\tau_i = \frac{\theta}{3.33}$
Option B:	$k_p = \frac{0.9\theta}{k\tau}$ and $\tau_i = 3.33\theta$
Option C:	$k_p = \frac{0.9\tau}{k\theta}$ and $\tau_i = 3.33\theta$
Option D:	$k_p = \frac{0.9\tau}{k\theta}$ and $\tau_i = \frac{\theta}{3.33}$
Q25.	If system is a first order delay process $\frac{ke^{-\theta s}}{\tau s+1}$, then Ziegler-Nichols tuning parameters k_p, τ_i and τ_d for PID controller are
Option A:	$k_p = \frac{2\tau}{k\theta}$, $\tau_i = 0.5\theta$ and $\tau_i = 1.2\theta$
Option B:	$k_p = \frac{2\tau}{k\theta}$, $\tau_i = 1.2\theta$ and $\tau_i = 0.5\theta$
Option C:	$k_p = \frac{1.2\tau}{k\theta}$, $\tau_i = 0.5\theta$ and $\tau_i = 2\theta$
Option D:	$k_p = \frac{1.2\tau}{k\theta}$, $\tau_i = 2\theta$ and $\tau_i = 0.5\theta$