University of Mumbai

Examinations Summer 2022

Program: Electronic & Telecommunication Engineering

SEM-IV (C Scheme) (R2019)

Subject: Microcontroller Course Code: ECC402

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	How can we change the speed of a DC motor using PWM in PIC 16F886 microcontroller?
Option A:	By changing amplitude of Pulse
Option B:	By keeping fixed duty cycle
Option C:	By changing duty cycle
Option D:	By increasing power of Pulse
2.	The high speed memory between the CPU and main memory is called as-------
Option A:	Cache Memory
Option B:	Virtual memory
Option C:	Secondary memory
Option D:	Storage memory
3.	The registers that provide control and status information about Timer/Counters in 8051 is --------.
Option A:	IP, IE
Option B:	TMOD, TCON
Option C:	SCON, SBUF
Option D:	Flag register, Accumulator
4.	The higher and lower bytes of a 16-bit register DPTR in 8051 are represented respectively as
Option A:	LDPTR and HDPTR
Option B:	DPTRL and DPTRH
Option C:	DPH and DPL
Option D:	HDP and LDP
5.	What is the function of a watchdog timer (WDT)?
Option A:	It resets the system if applied voltage increased above threshold value
Option B:	It resets the system if applied voltage decreases below threshold value
Option C:	It resets the system if the software fails to operate properly.
Option D:	It resets the system if Power failure is detected.
6.	In the instruction “MOV TH1, #-3”, what is the value that is being loaded in the TH1 register?
Option A:	FCH
Option B:	FBH
Option C:	FDH
Option D:	FEH
7.	How much flash memory does the Atmega328 have?
Option A:	13K bytes
Option B:	32K bytes

Option C:	256K bytes
Option D:	16K bytes
8.	Which of the following are pipelining stages of ARM7?
Option A:	Fetch, Decode, Write
Option B:	Fetch, Decode, Execute, Write
Option C:	Fetch, Execute, Write
Option D:	Fetch, Decode, Execute
9.	Which of the following register of ARM7 is used as Program Counter?
Option A:	CPSR
Option B:	SPSR
Option C:	R14
Option D:	R15
10.	Which of the following tool convert assembly language program into Machine language program.
Option A:	Assembler
Option B:	Converter
Option C:	Compiler
Option D:	Interpreter

11.	Program Counter of CPU --------.
Option A:	Holds address of the next instruction to be executed from memory.
Option B:	Personal Computer
Option C:	Holds frequently used data.
Option D:	Holds frequently used instructions.
12.	How many address lines a memory chip of 64K capacity will have?
Option A:	16
Option B:	64
Option C:	15
Option D:	6
13.	Which of the following is not control signal of memory?
Option A:	Write (WR)
Option B:	Data bus (D7-D0)
Option C:	Chip Select (CS)
Option D:	Read (RD)
14.	What is DMA?
Option A:	It allows to store data in stack memory
Option B:	It allows to store data in virtual memory
Option C:	DMA allow IO devices to access/retrieve data directly from the main memory
Option D:	It allows to store data in cache memory
15.	Which of the following is not semiconductor memory?
Option A:	Static Random-Access-Memory (SRAM)
Option B:	Dynamic Random-Access-Memory (SRAM)
Option C:	Flash Memory
Option D:	Magnetic Tape

16.	Which of the following memory needs refreshing circuit?
Option A:	DRAM
Option B:	SRAM
Option C:	Flash Memory
Option D:	NVRAM
17.	When a program tries to access a page that is mapped in address space but not loaded in physical memory, then ----.
Option A:	Page fault occurs
Option B:	Fatal error occurs
Option C:	No error occurs
Option D:	Segmentation fault occurs
18.	------- port of 8051 is a multifunctioning port.
Option A:	P0
Option B:	P1
Option C:	P2
Option D:	P3
19.	Mode-1 of timer-0 in 8051 works with ------ bits
Option A:	13 bits
Option B:	8 bits
Option C:	16 bits
Option D:	32 bits
20.	RS1-RS0 bits of program status word (PSW) are 01. R1 register of selected bank refers to ------- memory location.
Option A:	19H
Option B:	11H
Option C:	01H
Option D:	09H

21.	Which of the following register of 8051 is used to hold 16 bits address?
Option A:	Program status Word (PSW)
Option B:	TMOD
Option C:	DPTR
Option D:	SCON
22.	How much internal RAM is available for user in 8051?
Option A:	256B
Option B:	128KB
Option C:	256KB
Option D:	128B
23.	------ is not a standard baud rate supported for serial communication?
Option A:	9600Kbps
Option B:	2400 bps
Option C:	4800 bps
Option D:	1200 bps

24.	MOV A, @R1 instruction
Option A:	Move contents of R1 into ACC
Option B:	Move ASCII of R1 into ACC
Option C:	Move contents of ACC into R1
Option D:	Move contents of RAM whose address is held by R1 into ACC

25.	MOV A, #12H
	MOV B, #04H
	DIV AB
	After executing above set of instructions, A = ---- and B = ----.

Option A:	A = 3 and B = 4
Option B:	A = 0 and B = 0
Option C:	A = 3 and B = 0
Option D:	A = 4 and B = 2
26.	8051 based system is working with 11.059MHz crystal frequency. Calculate number of machine cycles required to execute following set of instructions. MOV R3, #200 HERE: DJNZ R3, HERE RET
Option A:	403
Option B:	200
Option C:	202
Option D:	400
27.	During serial communication, the data available in ------- register will be sent to outside world through TX pin of 8051 micro-controller.
Option A:	Accumulator (A)
Option B:	SBUF
Option C:	SCON
Option D:	TCON
28.	How many GPIO pin of 8051 are needed to interface 4x3 matrix keypad?
Option A:	12
Option B:	8
Option C:	7
Option D:	16
29.	Due to RISC based architecture, ARM7 takes ----- cycle to effectively execute an instruction.
Option A:	3
Option B:	5
Option C:	12
Option D:	1
30.	Which Cortex core is suitable for anti-lock braking (ABS) system of vehicle application?
Option A:	Cortex-A
Option B:	Cortex-R
Option C:	Cortex-M
Option D:	Cortex-B

31.	LDR R0, [R1] instruction of ARM ----------.
Option A:	Load contents of memory, whose address is held by R1 into R0.
Option B:	Load contents of R1 into R0
Option C:	Load contents of R0 into R1
Option D:	Load contents of R0 into memory, whose address is held by R1.
32.	Which of the following mode of ARM is used, when the processor encounters an instruction that is undefined or not supported by the implementation?
Option A:	System Mode
Option B:	Supervisory Mode
Option C:	Undefined Mode
Option D:	User Mode
33.	Which of the following register in ARM is used to store return address of subroutine?
Option A:	R0
Option B:	R13
Option C:	R15
Option D:	R14
34.	Thumb instructions of ARM consists of ------- bits.
Option A:	16
Option B:	8
Option C:	64
Option D:	32
35.	What is meant by R0 to R12 registers of ARM are orthogonal.
Option A:	Addition of all the registers is zero
Option B:	Instruction apply to R0 can equally applicable to R12.
Option C:	Product of any two register is zero
Option D:	All registers are out of phase.
36.	Which of the following is not supported by RISC architecture
Option A:	Length of all instructions is same
Option B:	Pipeline of execution
Option C:	Greater Complexity in hardware
Option D:	Reduced instruction set
37.	ADD A, 20H of 8051 store result in Accumulator after performing following operation.
Option A:	add contents of accumulator with immediate data 20H
Option B:	is invalid instruction
Option C:	perform logical AND operation with 20H
Option D:	data from location 20H added with Accumulator
38.	How much on chip flash memory is available in 89V51RD2 micro-controller?
Option A:	64Kbytes
Option B:	32Kbytes
Option C:	16KBytes
Option D:	1Kbytes

39.	10 bit, ADC is available in ATMEGA328P. Suppose V_{REF} = 5V is connected to microcontroller and Analog voltage in 3V, Calculate decimal equivalent of output signal.
Option A:	53
Option B:	614
Option C:	512
Option D:	256
40.	Which of the following is not criteria to choose microcontroller in embedded system?
Option A:	Speed of the operation
Option B:	Microcontroller architecture
Option C:	Aesthetic of system
Option D:	Power consumption

Sr. No.	**Q.1 or Q2 or Q3** **5 marks each**
1	Compare SRAM and DRAM memory
2	Explain Direct cache mapping in microprocessor-based system.
3	Explain primary and secondary memory in brief.
4	Classify memory based on data retention capabilities.
5	Compare CISC and RISC processor's architecture.
6	Compare Harvard and Von Neumann architecture of microprocessor.
7	Explain microcomputer based system in brief.
8	Write features of 89V51, ATMEGA 328P microcontroller. A Microcontroller based embedded system is to be developed with 10 bit ADC, SPI serial interface, comparator and 1 KB of EPROM. Select suitable microcontroller for the same.
9	Develop Embedded System for Real Time Clock using I2C.
10	Develop microcontroller based system to control speed of DC motor with the help of variable resistor.
11	Develop a system to read temperature in hall and display it on the LCD.
12	Compare Microprocessor and Microcontroller.
13	Draw and explain internal pin structure of P3 Port.
14	Draw and Explain Memory organization of 8051.
15	Explain TMOD register of 8051.
16	Explain Program Status Word (PSW) register of 8051.
17	Explain the concept of pipeline of ARM 7.
18	Explain Data processing, Data Transfer, Control flow with the help of example.
19	Explain Current Program Status Register of ARM7.
20	Compare instructions ACALL and LCALL of 8051.
21	Explain Assembler directive with the help of Examples.

Sr. No.	Q.1 or Q2 or Q3 10 marks each
1	Develop an assembly language program for 8051 microcontroller to generate square waveform of 500Hz & 50% duty cycle at pin P3.4. Assume 8051 is operating at frequency 12 MHz. Use hardware timer 0 in mode 1 to generate delay.
2	Develop assembly program of 8051 to perform following task. a) Load hexadecimal number 98 in R1 of bank-1 register. Write assembly language program to transfer data from R1 of bank-1 to R1 register of bank-2. b) Load hexadecimal number 98 in R1 of bank-1 register. Write assembly language program to transfer this data from R1 of Bank-1 to external memory location 0500H.
3	Explain SCON register of 8051. Determine Hexadecimal number to be loaded in SCON register to configure UART of 8051 to receive and transmit 8 bits with variable baud rate data.
4	Explain Cortex-A, Cortex-B and Cortex-C ARM Core. Select appropriate Cortex core to develop embedded system which enable various advance electronics feature in vehicle.
5	Explain three stage pipelines of ARM7. Determine number of cycles required to execute 10 instructions of ARM7 program.
6	A switch button and relay module are interfaced with 8051 microcontroller. Write assembly language program to turn ON relay if Switch button is pressed, otherwise Relay will remains OFF.
7	Write assembly language program to send "---Mumbai University---" string from microcontroller 8051 to outside world with 9600bps baud rate.
8	LCD 16x2 is interface with 8051. Write assembly language program to display "LCD" on screen.
9	A system is to be developed with the help of 89V51RD2, RTC and Seven segment display to display time. Explain above embedded system with the help of interfacing diagram.
10	What are the selection criteria to choose appropriate microcontroller to the embedded systems?
11	Explain Virtual memory concept with memory management.
12	Suppose five 8 bit numbers are stored from code memory location 500H onward. Find smallest number among them and store the result in accumulator
13	A LED is interface with 8051 at P1.1 pin. 8051 is operating at 11.059MHz. Develop assembly language program to blink this LED with 1 second interval.
14	Explain Interrupt of ARM7 with its vector table.
15	Explain Interrupt of 8051.
16	Explain ARM core data flow model.
17	Explain all operating modes of ARM7.
18	Explain timers of 8051 with the help of logical diagram.
19	Explain a system which consists of Processor, L1 cache. L2 cache, Main memory and Secondary memory.
20	Explain features of ARM7.

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SEM-IV (C Scheme) (R2019)

Subject: Microcontroller Course Code: ECC402

Answer Key

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	A
Q3.	B
Q4	C
Q5	C
Q6	C
Q7	B
Q8.	D
Q9.	D
Q10.	A
Q11	A
Q12	A
Q13	B
Q14	C
Q15	D
Q16	A
Q17	A
Q18	D
Q19	C
Q20	D

Question Number	Correct Option (Enter either ‘A’ or ‘B’ or ‘C’ or ‘D’)
Q21.	C
Q22.	D
Q23.	A
Q24	D
Q25	D
Q26	A
Q27	B
Q28.	C
Q29.	D
Q20.	B
Q31	A
Q32	C
Q33	D
Q34	A
Q35	B
Q36	C
Q37	D
Q38	A
Q39	B
Q40	C

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Examinations Summer 2022

Program: Electronics & Telecommunication

ECC403: Linear Integrated Circuits

Time: 2 hour 30 minutes Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	With zero volts on both inputs, an OP amp ideally should have an output ...
Option A:	equal to the positive supply voltage
Option B:	equal to the negative supply voltage
Option C:	equal to zero
Option D:	equal to the CMRR
2.	An opamp has a typical open loop gain of 1200 and the common mode rejection of 55 dB. What is the common mode rejection ratio?
Option A:	542
Option B:	562
Option C:	580
Option D:	590
3.	The input stage of an op amp is usually a
Option A:	CE amplifier
Option B:	Class B push pull amplifier
Option C:	Differential amp
Option D:	Swamped amplifier
4.	The op amp can amplify
Option A:	Both ac and dc signals
Option B:	DC signals only
Option C:	AC signals only
Option D:	Neither ac not dc signals
5.	If the bias current in IC 741 opamp is I_Q =19 µA and the internal frequency compensation capacitor C_1 = 30 pF, the slew rate of the opamp will be nearly
Option A:	1.58 V/µs
Option B:	1.26 V/µs
Option C:	0.93 V/µs
Option D:	0.63 V/µs
6.	The ideal opamp has
Option A:	Infinite voltage gain and zero input impedance
Option B:	Infinite voltage gain and infinite bandwidth
Option C:	Zero voltage gain and infinite CMRR
Option D:	Zero output impedance and zero CMRR
7.	What is the frequency of oscillation for an R-C phase shift oscillator with R of 10 kΩ and C of 0.001 µF in each of its three RC sections?
Option A:	5.0 kHz
Option B:	5.5 kHz

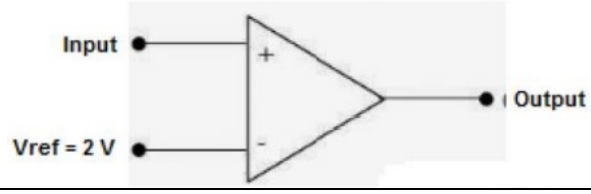
Option C:	6.0 kHz
Option D:	6.5 kHz
8.	For a summing amplifier if V_1 = -3.3 V , V_2 = 0.8 V, R_1 = 33 kΩ, R_2 = 10 kΩ and R_F = 330 kΩ, calculate the output voltage.
Option A:	0 V
Option B:	6.6 V
Option C:	-4 V
Option D:	2 V
9.	Sustained oscillation in Wein bridge oscillator is possible when the value of ß is
Option A:	3
Option B:	1/3
Option C:	1
Option D:	2
10.	Op-amp integrator uses:
Option A:	Capacitor as feedback element
Option B:	Resistor as feedback element
Option C:	Inductor as feedback element
Option D:	A simple wire as feedback element
11.	Voltage to current converter is also called as
Option A:	Current series negative feedback amplifier
Option B:	Voltage series negative feedback amplifier
Option C:	Current series positive feedback amplifier
Option D:	Voltage series positive feedback amplifier
12.	Calculate the cut-off frequency of a first-order low-pass filter for R_F = 2.5 kΩ and C_1 = 0.05 µF.
Option A:	1.273 kHz
Option B:	12.73 kHz
Option C:	127.3 kHz
Option D:	127.3 Hz
13.	The advantages of precision rectifiers are
Option A:	absence of forward voltage drop
Option B:	absence of forward current drop
Option C:	absence of infinite voltage drop
Option D:	present of infinite voltage drop
14.	Which of this is used as Zero crossing detector
Option A:	inverting or non-inverting comparators
Option B:	inverting and non-inverting comparators
Option C:	inverting or non-inverting amplifier
Option D:	inverting and non-inverting amplifier
15.	The output of Schmitt trigger is
Option A:	triangle waveform
Option B:	sinusoidal waveform
Option C:	sawtooth waveform
Option D:	pulse waveform

16.	In an instrumentation amplifier, the output voltage is based on the _____ times a scale factor.
Option A:	Summation of 2 inputs
Option B:	Product of 2 inputs
Option C:	Difference between 2 inputs
Option D:	Division of 2 inputs
17.	The Purpose of comparator is to
Option A:	Produce a change in input voltage when input voltage is equal to reference voltage
Option B:	detect the occurrence of a changing input voltage
Option C:	amplify an input voltage
Option D:	Maintain a constant output when dc input voltage changes
18.	Why zener diode is used at the output terminal of square wave generator?
Option A:	To reduce both output and capacitor voltage swing
Option B:	To reduce capacitor voltage swing
Option C:	To reduce input voltage swing
Option D:	To reduce output voltage swing
19.	In a 555 timer, a series connection of three resistors sets the reference voltage levels to the two comparators at _____ and _____.
Option A:	VCC, VCC/2
Option B:	VCC/2, VCC/4
Option C:	2VCC/3, VCC/3
Option D:	VCC, VCC
20.	For 555 astable multivibrator, if C= 0.01 μF, R_A = 10 kΩ, R_B = 50 kΩ, the frequency and the duty cycle will be nearly
Option A:	1.6 kHz and 54.5 %
Option B:	1.3 kHz and 54.5%
Option C:	1.6 kHz and 46.5%
Option D:	1.3 kHz and 46.5 %
21.	Multivibrator Circuit that remains in stable state until a triggering signal causes a transition to quasi stable state and returns to stable state after certain time is called
Option A:	Astable multivibrator
Option B:	Monostable multivibrator
Option C:	Bistable multivibrator
Option D:	Unistable multivibrator
22.	The 555 Timer IC got its name from the three 5KΩ resistors that are used in
Option A:	input frequency network
Option B:	voltage divider network.
Option C:	current divider network.
Option D:	Load network
23.	The time period of a monostable 555 multivibrator is given as .
Option A:	T = 0.33RC
Option B:	T = 1.1RC
Option C:	T = 3RC

Option D:	T = 3RC
24.	Output of LM317 is adjustable between
Option A:	5 V and 37 V
Option B:	1.2 V and 37 V
Option C:	10 V and 37 V
Option D:	1.5 V and 37 V
25.	The 7912 regulator IC provides _____ .
Option A:	12V
Option B:	-12V
Option C:	5V
Option D:	-5V
26.	A negative adjustable voltage regulator produces
Option A:	a regulated negative voltage
Option B:	a regulated positive voltage
Option C:	a regulated negative and positive voltage
Option D:	a regulated positive or negative voltage
27.	Switching regulators are series type regulators, which has _____ power dissipation & _____ efficiency.
Option A:	increased, increased
Option B:	increased, reduced
Option C:	reduced, increased
Option D:	reduced, reduced
28.	In IC 723 output current levels upto
Option A:	300 mA
Option B:	200 mA
Option C:	100 mA
Option D:	150 mA
29.	In LM317 voltage regulator, what is the minimum value of voltage required between its input & output in order to supply power to an internal circuit?
Option A:	1V
Option B:	5V
Option C:	3V
Option D:	20V
30.	Which performance parameter of a regulator is defined as the change in regulated load voltage due to variation in line voltage in a specified range at a constant load current?
Option A:	Load regulation
Option B:	Line regulation
Option C:	Temperature stability factor
Option D:	Ripple rejection
31.	When the loop is in lock in a PLL, the input frequency is _____ the output frequency from the VCO.
Option A:	the same as
Option B:	greater than

Option C:	smaller than
Option D:	None of the above
32.	LM 317 is a
Option A:	Voltage regulator
Option B:	Counter
Option C:	Shift register
Option D:	ALU
33.	The change in output voltage for the corresponding change in load current in a 7805 IC regulator is defined as
Option A:	Line regulation
Option B:	Load regulation
Option C:	Input regulation
Option D:	Ripple rejection
34.	In IC 723 a series pass transistor is present at
Option A:	pin 2 and 3
Option B:	pin 10 and 11
Option C:	pin 6 and 7
Option D:	pin 4 and 5
35.	The % load regulation of a power supply should be ideally _____ & practically _____.
Option A:	zero, small
Option B:	small, zero
Option C:	zero, large
Option D:	large, zero
36.	Phase Locked Loop IC 565 consist of
Option A:	input and square wave detector
Option B:	TTL and DTL
Option C:	VCO and phase detector
Option D:	VCO and pulse detector
37.	Operating voltage range of IC565 is
Option A:	±2V to ±12V
Option B:	±2V to ±10V
Option C:	±5V to ±10V
Option D:	±5V to ±12V
38.	In PLL, the capture range is always _____the lock range.
Option A:	greater than
Option B:	equal to
Option C:	less than
Option D:	either greater than or equal to
39.	Which of the following best describes the output of a 566 voltage-controlled oscillator?
Option A:	Half rectified sine wave
Option B:	Both square- and triangular-wave
Option C:	Abrupt waveform

Option D:	Full rectified Sine-Wave
40.	How many Vcc connections does the 565 PLL use?
Option A:	0
Option B:	2
Option C:	1
Option D:	3

Q2	**5 Marks question**
1	For a regulated power supply the output voltage varies from 12V to 11.6 V when the load current is varied from 0 to 100 mA which is the maximum value of I_L. If the ac line voltage and temperature are constant, calculate the load regulation, % load regulation and output resistance of the power supply.
2	Compare ideal and practical opamp.
3	Compare linear and switching regulators.
4	Short note on PLL IC 565.
5	Short note on Precision rectifiers
6	How precision rectifiers are different from ordinary diode rectifiers.
7	Design a circuit for $V_0 = 2V_1 - 3V_2$ using single opamp and few resistors.
8	Short note on three terminal fixed voltage regulators.
9	Design a circuit for $V_0 = V_1 + V_2$ using single opamp and few resistors.
10	Explain opamp as window detector.
11	Short note on voltage to current converter.
12	Explain current to voltage converter.
13	Short note on peak detector circuit.
14	Short note on VCO IC 566.
15	Explain the application of IC 565 as FSK Demodulator.
16	Explain the application of IC 566 as Frequency modulator.
17	Design a monostable multivibrator using IC 555 timer to obtain pulse width of 10 msec.
18	Design a first order low pass filter to provide a cut off frequency of 10 kHz.
19	If the input to the ideal comparator shown in the fig below is a sinusoidal signal of 8 volt peak to peak without any DC component then check whether the duty cycle of the output of comparator is 33.33% or 25% or 20%. Prove it. 
20	Explain zero crossing detector.
21	Draw the circuit diagram of Schmitt trigger to achieve hysteresis of 4V with UTP = 7V, LTP=3V, Vcc=12V and Vee=-12V.
22	State and explain Barkhausean criteria.
23	Short note on active filters.
24	Compare astable with monostable multivibrator.

25	Explain the block diagram of opamp.
26	Define CMRR, Slew rate, Input offset voltage and input offset current.

Q3	**10 marks**
1	Draw a neat diagram of RC phase shift oscillator using opamp. Derive its frequency of oscillation. What are the values of R and C for frequency of oscillation to be 1kHz.
2	With the help of neat diagram, input and output waveforms and voltage transfer characteristics explain the working of non-inverting Schmitt trigger. Derive the expression for its threshold levels.
3	With the help of neat diagram, input and output waveforms and voltage transfer characteristics explain the working of inverting Schmitt trigger. Derive the expression for its threshold levels.
4	Design a differentiator to differentiate an input signal that varies in frequency from 10Hz to about 500 Hz. Draw its frequency response. If a sinewave of 2V peak at 500 Hz is applied to a differentiator, write expression for its output and draw output waveform.
5	Draw the circuit diagram of a square and triangular waveform generator using opamp. With the help of waveforms at suitable points in the circuit explain its working. Explain how duty cycle can be varied?
6	Sketch the implementation of an instrumentation amplifier using three opamps and explain its operation.
7	Design a Schmitt trigger circuit to convert 5V, 1kHz sinusoidal signal to square wave using 741IC, V_{UT} = 0.8 V, V_{LT} = -0.8 V and $\pm V_{sat} = \pm$ 11 V. Draw its transfer characteristics, input and output waveforms.
8	Design an IC 555 astable multivibrator for an output frequency 1kHz and a duty cycle of 60%.
9	Design a Wein bridge oscillator using opamp to oscillate at a frequency of 965Hz and explain the working of Wein Bridge oscillator.
10	Design a second order Butterworth high pass filter for a cut off frequency of 1 kHz and pass band gain of 2.
11	With the help of functional block diagram explain the working of voltage regulator LM317.
12	Design a second order low pass filter for a cut off frequency of 1 kHz and passband gain of 1.586.
13	Design a voltage regulator using IC 7805 that will deliver 0.25 A current to a 48 ohm, 10W load.
14	Design a voltage regulator for an output of 15V and output current of 1.5A.
15	Design a voltage regulator using IC 723 to give output voltage of 15V and output current of 150 mA.

Program: Electronics & Telecommunication
ECC403: Linear Integrated Circuits

Time: 2 hour 30 minutes Max. Marks: 80

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Question	Correct Option
Q1.	C
Q2.	B
Q3.	C
Q4	A
Q5	D
Q6	B
Q7	D
Q8.	B
Q9.	B
Q10.	A
Q11.	A
Q12.	A
Q13.	A
Q14.	A
Q15.	D
Q16.	C
Q17.	A
Q18.	D
Q19.	C
Q20.	B
Q21.	B
Q22.	B
Q23.	B

Q24.	B
Q25.	B
Q26	A
Q27	C
Q28	C
Q29	C
Q30	B
Q31	A
Q32	A
Q33	B
Q34	B
Q35	A
Q36	C
Q37	D
Q38	C
Q39	B
Q40	B

University of Mumbai

Examination Summer 2022

Time : 2 hours 30 minutes ECC404:SIGNALS AND SYSTEM Max. Marks :80

Q1.	Choose the correct option for the following questions . All the questions are compulsory and carry equal marks.
1.	A discrete signal is said to be even or symmetric if x(-n) is equal to
Option A	x(n)
Option B	–x(n)
Option C	–x(-n)
Option D	0
2.	Under what conditions the three signals x(t), y(t) and z(t) with period t1 t2 and t3 respectively are periodic?
Option A	t1/t2/t3= rational
Option B	All the ratios of the three periods in any order is rational
Option C	t1/t2 is rational
Option D	t1/t2= t2/t3
3.	What is the period of the signal: 2cost/6?
Option A	16π
Option B	10π
Option C	8π
Option D	12π
4.	After converting the input and output to a dummy variable, the next step of convolution is _____
Option A	Shift the impulse response
Option B	Changing the dummy variables

Option C	Shifting any one of the signals to left side i.e towards the negative direction
Option D	Shift the input
5.	The continuous time system described by the equation y(t) = x(t^2) comes under which category
Option A	causal, linear and time varying
Option B	non causal, linear and time-variant
Option C	non causal, non-linear and time-invariant
Option D	causal, non-linear and time varying
6.	Find auto correlation of x(n)= { 1,2,3,4}
Option A	4, 11, 20, 30, 11, 20, 4
Option B	4, 11, 20, 30, 20, 11, 4
Option C	4, 20, 3, 5, 11, 2, 4
Option D	4, 2, 11, 5, 3 ,20, 4
7.	Find circular convolution of periodic signals x(n)= {1,2,3,4} and h(n)= {2,2,1,1}
Option A	15,13,12,17
Option B	17,2,13,5
Option C	15,13,15,17
Option D	5,13, 2 ,17
8.	What is the convolution of a signal with an impulse?
Option A	A new signal
Option B	Signal multiplied by impulse
Option C	Impulse
Option D	Signal itself
9.	Which of the following responses of an LTI system does not depend on initial conditions?

Option A	Natural response
Option B	free response
Option C	forced response
Option D	total response
10.	The Fourier transform of a function is equal to its two-sided Laplace transform evaluated _____
Option A	On the real axis of the s-plane
Option B	On the line parallel to the real axis of the s-plane
Option C	On the imaginary axis of the s-plane
Option D	On the line parallel to the imaginary axis of the s-plane
11.	Which of the following is an energy signal?
Option A	$x(t)=A\ e^{j\Omega t}$
Option B	$x(t)=A \sin \Omega t$
Option C	$x(t)=B \cos \Omega t$
Option D	$x(t)=e^{-at}\ u(t)$
12.	Y (t) = x (t/5) is _____
Option A	Amplitude scaled signal by factor 1/5
Option B	Time shifted signal
Option C	Expanded signal
Option D	Compressed signal
13.	The Fourier transform of a $x(t)= e^{7t}\ u(-t)$ function is given as:
Option A	F (jω) = 1/(7+jω)
Option B	F (jω) = 7/(1+jω)
Option C	F (jω) = 7/(1-jω)
Option D	F (jω) = 1/(7-jω)
14.	In the equation x (t) = be^at if a < 0, then it is called _____

Option A	Decaying exponential
Option B	Both Growing and Decaying exponential
Option C	Complex exponential
Option D	Growing exponential
15.	Find the Z-transform of $\delta(n+3)$.
Option A	1
Option B	z
Option C	z^2
Option D	z^3
16.	The step function u (t) is integral of_____with respect to time t.
Option A	Exponential function
Option B	Impulse function
Option C	Ramp function
Option D	Sinusoidal function
17.	Find the Z-transform of u(-n).
Option A	1/(1-z)
Option B	1/(1+z)
Option C	z/(1-z)
Option D	z/(1+z)
18.	For what kind of signals one sided z-transform is unique?
Option A	All signals
Option B	Anti-causal signal
Option C	Causal signal
Option D	Non-causal
19.	What is the one-sided z-transform of $x(n)=\delta(n-k)$?

Option A	0
Option B	1
Option C	z^{-k}
Option D	z^{k}
20.	Linear convolution between two sequences $x_1(n) = \{-1_{\omega_t}, 1, 2, -2\}$ and $x_2(n) = \{0.5, 1_{\omega_t}, -1, 2, 0.75\}$ is
Option A	$\{-0.3, -0.6_{\omega_t}, 3, -2, -2.75, 6.75, -2.5, -1.6\}$
Option B	$\{-0.1, -0.5_{\omega_t}, 3, -4, -2.75, 9.75, -2.5, -1.5\}$
Option C	$\{-0.5, -0.5_{\omega_t}, 3, -2, -2.75, 6.75, -2.5, -1.5\}$
Option D	$\{-0.5, -0.4_{\omega_t}, 1, -2, -2.75, 6.75, -2.5, -1.5\}$
21.	Find the final value, $x(\infty)$ in time domain for the s-domain signal $X(s)=s/(s^2+4)$.
Option A	0
Option B	1
Option C	0.25
Option D	1.25
22.	Which of the following systems is stable?
Option A	y(t) = exp(x(t))
Option B	y(t) = log(x(t))
Option C	y(t) = tx(t) + 1
Option D	y(t) = sin(x(t))
23.	The convolution of u(n) with u(n-4) at n=5 is
Option A	5
Option B	2
Option C	1

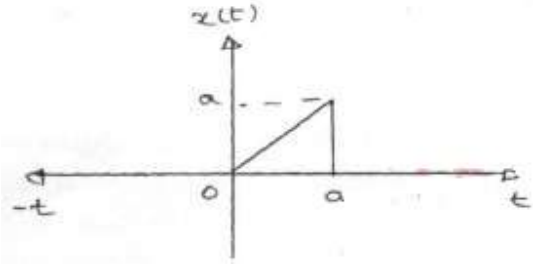
Option D	0
24.	The samples of a cosine wave at zero frequency are equivalent to samples of
Option A	Sine wave
Option B	A DC signal
Option C	A cosine wave
Option D	An unknown signal
25.	Determine whether the signal, x(t)=3 cos $2t$ + 7 cos 5 π t is periodic or not
Option A	Non-Periodic
Option B	Periodic
Option C	Rational
Option D	Irrational
26.	If input to a system is not bounded , then system is
Option A	stable
Option B	Unstable
Option C	Cannot be tested
Option D	ideal
27.	Which one of the following systems is causal?
Option A	$y(t)=x(t)+x(t-3)+x(t^2)$
Option B	$y(n)=x(n+2)$
Option C	$y(t)=x(t-1)+x(t-2)$
Option D	$y(n)=x(2n^2)$
28.	Find the Nyquist rate and Nyquist interval for the signal f(t)=(sin 500πt) / πt.
Option A	500 Hz, 2 sec
Option B	500 Hz, 2 msec
Option C	2 Hz, 500 sec

Option D	2 Hz, 500 msec
29.	The impulse response h (t) of an LTI system is given by $e^{-2t}u(t)$. What is the step response?
Option A	$y(t) = \frac{1}{2}(1 - e^{-2t})\, u(t)$
Option B	$y(t) = \frac{1}{2}(1 - e^{-2t})$
Option C	$y(t) = (1- e^{-2t})\, u(t)$
Option D	$y(t) = \frac{1}{2}(e^{-2t})\, u(t)$
30.	Fourier transform is evaluation of Laplace transform along the_____axis in s-plane.
Option A	Real
Option B	Imaginary
Option C	Z domain
Option D	S domain
31.	Determine the convolution of $x_1(t)= e^{-2t}\, u(t)$ and $x_2(t)=e^{-6t}\, u(t)$, using Fourier Transform?
Option A	$0.25(e^{-2t} – e^{-6t})\, u(t)$
Option B	$0.15(e^{-2t} – e^{-6t})\, u(t)$
Option C	$0.25(e^{-3t} – e^{-6t})\, u(t)$
Option D	$0.35(e^{-2t} – e^{-5t})\, u(t)$
32.	In IIR systems, the_____structure will give direct relation between time domain and z domain.
Option A	Direct form-I
Option B	Direct form
Option C	Linear phase
Option D	Direct form-II
33.	Where does the maximum value of auto-correlation function of a power signal occur?
Option A	At unity

Option B	At origin
Option C	At extremities
Option D	At infinity
34.	Determine the Time period of: x(t)=3 cos(20t+5)+sin(8t-3).
Option A	2/5 sec
Option B	1/10 sec
Option C	1/20 sec
Option D	2/4 sec
35.	Which among the following is a LTI system?
Option A	y(t)=x(t)cosπt
Option B	y(n)=x(n)+nx(n-1)
Option C	dy(t)/dt+ty(t)=x(t)
Option D	y(n)=x3 (n+1)
36.	∂(at) = 1⁄a ∂(t), this property of unit impulse is called _____
Option A	Time scaling property
Option B	Time shifting property
Option C	Time reversal property
Option D	Amplitude scaling property
37.	For energy signal_____ Select one
Option A	E= ∞
Option B	E=0
Option C	P=0
Option D	P= ∞
38.	The impulse response of a continuous time LTI system is H (t) = e-t u (t-2). The system is _____

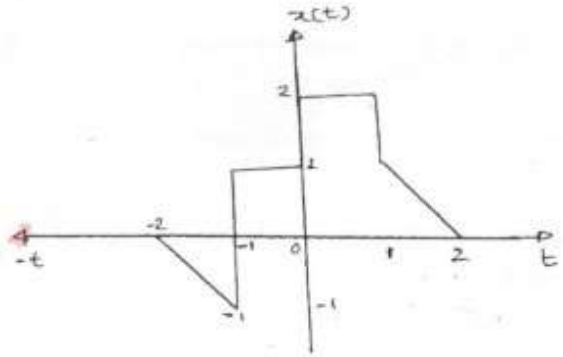
Option A	Neither causal nor stable
Option B	Causal but not stable
Option C	Stable but not causal
Option D	Causal and stable
39.	Find the value of h[n]*d[n-5], d[n] being the delta function
Option A	h[n-4]
Option B	h[n-5]
Option C	h[n-2]
Option D	h[n+5]
40.	Which of the following is not a fourier transform pair?
Option A	$u(t) \leftrightarrow \pi\delta(\omega) + 1/jw$
Option B	$sgn(t) \leftrightarrow 2/j\omega$
Option C	$A \leftrightarrow 2\pi\delta(\frac{w}{2})$
Option D	$G(t) \leftrightarrow sa(\frac{w\tau}{2})$

Q2	**Questions of 5 marks each**
1	State and prove any two properties of Fourier Transform.
2	Determine the following systems are memory less, causal, linear or Time invariant *y(t)=5x(t) +2*
3	Using Laplace Transform, determine the natural response of the system represented by the following equations. $(d^2y(t)/dt^2) + 10\,(dy(t)/dt) + 21\,y(t) = 8\,x(t)$, $y(0)=2$, $(dy(t)/dt) = -3$ at $t=0$
4	Explain in brief the ROC conditions in Laplace Transform.
5	Determine the autocorrelation of the CT signal given by *x(t)=A rect (t/2).*
6	The Impulse response of DT system is given by *h[n]= {1,2,3}* and the output response is given by *y[n]= {1,1,2,-1,3},* Using Z-Transform, determine x[n] by long division method.
7.	Determine energy and power of signal x(t)= cos5wt

8.	Test the given system for linearity, causality,stability and time variance $y(t)=x(\frac{2}{t})$
9.	Find initial and final value of given Z domain signal $X(Z)=\frac{2Z^{-1}}{1-1.8Z^{-1}+0.8Z^{-2}}$
10.	Realize the following FIR system with minimum number of multipliers h(n)={-0.5,0.8,-0.5}
11.	List any 5 properties of Z transform
12.	FInd the response of time invariant system with impulse response h(n)={1,2,1,-1} to an input signal x(n)= {1,2,3,1}
13.	Explain any five types of elementary signals with mathematical equations and graphical plot.
14.	Find the fundamental period of the signal $x(t)=\sin\left(\frac{2\pi t}{6}\right)-\cos \pi t$
15.	Find x(-2t) and x(3t+2) 
16.	Find the even and odd part of following signals 1) $x(t)= 3+2t+5\frac{2}{t}$ 2)sin2t+cost+sintcos2t
17.	Determine energy and power of unit step signal
19.	Find laplace transform of u(t)-u(t-a)
20.	Find inverse Z transform of $X(z)=\frac{1}{1-1.5z^{-1}+0.5z^{-2}}$
21.	Determine initial and final value using initial and final value theorems for $X(s)=\frac{s+1}{s^2+2s+2}$

Q3.	**Questions of 10 marks each**
1.	Consider a causal LTI system with $H(j\omega) =(j\omega+2)^{-1}$. For a particular input $x(t)$, this system produces output $y(t)=e^{-2t}\,u(t)-e^{-3t}\,u(t)$. Find out $x(t)$ using Fourier Transform.
2.	A LTI system has the following transfer function

	$$H(z) = \frac{z}{(z-\frac{1}{4})(z+\frac{1}{4})(z-\frac{1}{2})}$$ Give all possible ROC condition a) Show pole-zero diagrams b) Find impulse response of system c) Comment on the system stability and causality for all possible ROC's
3.	Obtain Inverse Laplace Transform of the function $X(s)=(3s+7)/(s^2-s-12)$ for following ROCs, also comment on the stability and causality of the systems for each of the ROC conditions. Support your answer with appropriate sketches of ROCs. i. $Rs(s)>4$ ii. $Re(s)<-3$
4.	A discrete time signal is given by x[n]={1,1,1,1,2} Sketch the following signals a) x[n-2] b) x[n+1] c) x[3-n] d) x[n]u[n-1] e) x[n-1] δ[n-1]
5.	Find the autocorrelation,power and PSD of x(t)= 3 cost +4 cos3t
6.	Find inverse laplace transform of $$X(s) = \frac{4}{(s+2)(s+4)}$$ if ROC is i) -2 > Re{s}> -4 ii) Re{s}< -4 iii) Re{s}> -2
7.	Using Laplace transform determine complete response of system described by following equation $$\frac{d^2y(t)}{dt^2} + 6\frac{dy(t)}{dt} + 8y(t) = \frac{dx(t)}{dt} + x(t)$$ where $y(\bar{0}) = 1\ \frac{dy(\bar{0})}{dt} = 3$ for input x(t)= u(t)
8.	Determine the convolution of $x_1(t)=e^{-3t}u(t)$ and $x_2(t)=e^{-5t}u(t)$ using fourier transform
9.	Find the digital network in cascade and parallel form realizations for the system described by the difference equation $$y(n) = \frac{-3}{8}y(n-1) + \frac{3}{32}y(n-2) + \frac{y(n-3)}{64} + x(n) + 3x(n-1) + 2x(n-2)$$

10.	Find linear phase realization of H(z) $H(z) = \frac{1}{4} + \frac{z^{-1}}{2} + \frac{3z^{-2}}{4} + \frac{z^{-3}}{2} + \frac{z^{-4}}{4}$
11.	Find fourier transform of sgn(t)
12.	Find the impulse response h(n) of the system if the spectrum is given by $H(e^{jw}) = \frac{1}{3}(1 + cosw)$
13.	Determine fourier transform of the gate function x(t)=A for $\|t\| \leq \frac{\tau}{2}$
14.	Find initial and final value using laplace transform $X(s) = \frac{7s+6}{s(3s+5)}$
15.	Explain relation of ESD, PSD with autocorrelation
16.	Find response of LTI system if impulse response of the system is $h(t) = 2e^{-3t}u(t)$ for input $x(t) = 2e^{-5t}u(t)$ using fourier transform
17.	Determine fourier transform of $x(t) = 1-t^2$; for $\|t\| < 1$ $= 0$; for $\|t\| > 1$
18.	Sketch the following signals for the given signal shown 1) x(-t) 2) x(2t+5) 3)x(2t) 4)x(t/2) 5) -2x(t) 
19.	Given DT sequence: $x(n) = 0.4\delta(n+2) + 0.2\delta(n+1) + 0.1\delta(n) + 0.2\delta(n-1) + 0.4\delta(n-2)$ Determine the following: i. Xe^{jw} ii. $\|Xe^{jw}\|$ iii. Phase $\{X(e^{jw})\}$ iv. $\int_0^{2\pi} \|X(e^{jw})\|^2 dw$

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Time : 2 hours 30 minutes Max. Marks :80

Question	Correct Option
Q1.	A
Q2.	B
Q3.	D
Q4.	C
Q5.	B
Q6.	B
Q7.	C
Q8.	D
Q9.	C
Q10.	C
Q11.	D
Q12.	C
Q13.	D
Q14.	A
Q15.	D
Q16.	B
Q17.	A
Q18.	C
Q19.	C
Q20.	C
Q21.	A
Q22.	D

Q23.	B
Q24.	B
Q25.	A
Q26.	B
Q27.	C
Q28.	B
Q29.	A
Q30.	B
Q31.	A
Q32.	A
Q33.	B
Q34.	A
Q35.	D
Q36.	A
Q37.	C
Q38.	D
Q.39.	B
Q.40	D

University of Mumbai

Examinations Summer 2022

Program: Electronic & Telecommunication Engineering

SEM-IV (C Scheme) (R2019)

Subject: PCE Course Code: ECC405

Time: 2hour 30 minutes Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which noise is generated due to random behavior of charge carriers?
Option A:	Shot noise
Option B:	Partition noise
Option C:	Industrial noise
Option D:	Flicker noise
2.	What is the circuit used for producing AM called?
Option A:	Modulator
Option B:	Transmitter
Option C:	Receiver
Option D:	Duplexer
3.	What is special circuit used to generate a Double sideband suppressed carrier signal?
Option A:	Sideband suppressor
Option B:	Anti-modulator
Option C:	Balanced modulator
Option D:	Carrier suppressor
4.	Pre-Emphasis Circuit is used to amplify what kind of frequencies?
Option A:	Low
Option B:	High
Option C:	Moderate
Option D:	Oscillator
5.	According to Sampling Theorem, Sampling frequency is ------- of modulating frequency.
Option A:	Less than or equal to twice of Modulating frequency
Option B:	Greater than or equal to Modulating frequency
Option C:	Greater than or equal to half of Modulating frequency
Option D:	Greater than or equal to twice of Modulating frequency.
6.	Which pulse modulation technique gives comparatively high SNR?
Option A:	PAM
Option B:	PWM
Option C:	PPM
Option D:	WDM
7.	Aliasing refers to
Option A:	Sampling of signals greater than at Nyquist rate
Option B:	Sampling of signals less than at Nyquist rate

Option C:	Sampling of signals at Nyquist rate
Option D:	demodulation
8.	The standard value for Intermediate Frequency (IF) in AM receivers is
Option A:	455 KHz
Option B:	580 KHz
Option C:	10.7 MHz
Option D:	50 MHz
9.	What causes a quantization noise in PCM system?
Option A:	Serial transmission errors
Option B:	The approximation of the quantized signal
Option C:	The synchronization between encoder and decoder
Option D:	Binary coding techniques
10.	The ratio between the modulating signal voltage and the carrier voltage is called?
Option A:	Amplitude modulation
Option B:	Modulation frequency
Option C:	Modulation index
Option D:	Ratio of modulation
11.	What is the BW of DSB-SC signal?
Option A:	fm
Option B:	2fm
Option C:	fm/2
Option D:	fc+fm
12.	What is the sequence of operations in which PCM is done?
Option A:	Quantizing, encoding, sampling
Option B:	Sampling, quantizing, encoding
Option C:	Quantizing, sampling, encoding
Option D:	Sampling, encoding, quantization
13.	Calculate the side band power in an SSBSC signal when there is 50% modulation and the carrier power is 100W.
Option A:	50 W
Option B:	25 W
Option C:	6.25 W
Option D:	12.5 W
14.	A super heterodyne receiver with an IF of 450 kHz is tuned to a signal at 1250 kHz. The image frequency is
Option A:	1700 kHz
Option B:	2150 kHz
Option C:	1650 kHz
Option D:	2100 kHz
15.	For a three-stage cascade amplifier, calculate the overall noise figure when each stage has a gain of 12 DB and noise figure of 8dB.
Option A:	12
Option B:	24
Option C:	13.55
Option D:	8

16.	Which of the following analog modulation schemes requires the minimum transmitted power and minimum channel bandwidth?
Option A:	VSB
Option B:	DSB-SC
Option C:	SSB
Option D:	AM
17.	In PM, the information is transmitted using
Option A:	change in phase of the carrier
Option B:	change in position of the carrier
Option C:	change in amplitude of the carrier
Option D:	change in frequency of the carrier
18.	The process of impressing a low frequency information signals onto a high-frequency carrier signal is called as _____
Option A:	demodulation
Option B:	modulation
Option C:	oscillation
Option D:	amplification
19.	ARMSTRONG method is used for the generation of
Option A:	DSB-SC
Option B:	DSB-FC
Option C:	Direct FM
Option D:	Indirect FM
Q20.	If signal x(t) has maximum frequency of "W" Hz then Nyquist Interval is given by
Option A:	W
Option B:	1/W
Option C:	2W
Option D:	1/2W
Q21.	Pre-emphasis in FM system involves
Option A:	compression of the modulating signal
Option B:	expansion of the modulating signal
Option C:	amplification of lower frequency component of modulating signal
Option D:	amplification of higher frequency component of modulating signal
Q22.	In a radio receiver, the local oscillator is tuned to a frequency
Option A:	lower than the incoming frequency
Option B:	higher than the incoming frequency
Option C:	equal to incoming frequency
Option D:	half of the incoming frequency
Q23.	When two networks are connected in series, its composite noise figure can be given as
Option A:	F1+(F2-1)/G1
Option B:	F1-(F2-1)/G1
Option C:	F2+(F1-1)/G1
Option D:	F1G1+(F2-1)

Q24.	The AM spectrum consists of
Option A:	Carrier frequency
Option B:	Upper side band frequency
Option C:	Lower side band frequency
Option D:	Carrier Frequency, Upper side band frequency and Lower sideband frequency
Q25.	For an AM DSB-FC envelope with Vmax =20 V and Vmin = 4V, what will be the peak amplitude of carrier
Option A:	20
Option B:	4
Option C:	8
Option D:	12
26.	Noise Factor (F) and Noise Figure (NF) are related as
Option A:	NF = 10 log10(F)
Option B:	F = 10 log10(NF)
Option C:	NF = 10 (F)
Option D:	F = 10 (NF)
27.	Noise in a communication system originates in:
Option A:	the sender
Option B:	the receiver
Option C:	the channel
Option D:	the sender, the receiver, the channel
28.	Shot noise is generated in:
Option A:	transistors and diodes
Option B:	resistors
Option C:	copper wire
Option D:	Only diodes
29.	VSB modulation is preferred in TV because
Option A:	it reduces the bandwidth requirement to half
Option B:	it avoids phase distortion at low frequencies
Option C:	it results in better reception
Option D:	it saves power
30.	Most of the power in an AM signal is in the
Option A:	Carrier
Option B:	Upper Sideband
Option C:	Lower Sideband
Option D:	Modulating Signal
31.	A 100MHz carrier is frequency modulated by 10 KHz wave. For a frequency deviation of 50 KHz, calculate the modulation index of the FM signal.
Option A:	100
Option B:	50
Option C:	70
Option D:	90
32.	The function of an AM detector circuit is to
Option A:	rectify the input signal

Option B:	discard the carrier
Option C:	provide audio signal
Option D:	rectify the input signal by discarding the carrier to provide audio signal
33.	In Pulse Position Modulation, the drawbacks are
Option A:	Synchronization is required between transmitter and receiver
Option B:	Large bandwidth is required as compared to PAM
Option C:	It doesn't need any synchronization
Option D:	It needs synchronization between transmitter & receiver and requires large bandwidth as compared to PAM
34.	The sampling technique having the minimum noise interference is
Option A:	Instantaneous sampling
Option B:	Natural sampling
Option C:	Flat top sampling
Option D:	Instantaneous, Natural & Flat top sampling
35.	Which of the following is digital multiplexing technique?
Option A:	FDM
Option B:	Asynchronous TDM
Option C:	Synchronous TDM
Option D:	Asynchronous & Synchronous TDM both
36.	When two or more signals share a common channel, it is called:
Option A:	sub-channeling
Option B:	signal switching
Option C:	SINAD
Option D:	multiplexing
37.	Indicate which one of the following is not an advantage of FM over AM:
Option A:	Better noise immunity is provided
Option B:	Lower bandwidth is required
Option C:	The transmitted power is more useful
Option D:	Less modulating power is required
38.	With high-level AM:
Option A:	the RF amplifiers are typically Class A
Option B:	the RF amplifiers are typically Class B
Option C:	the RF amplifiers are typically Class C
Option D:	the RF amplifiers are typically Class AB
39.	Basically, sensitivity measures:
Option A:	the weakest signal that can be usefully received
Option B:	the highest-frequency signal that can be usefully received
Option C:	the dynamic range of the audio amplifier
Option D:	Ratio of input signal to output signal
40.	In delta modulation, "granular noise" is produced when:
Option A:	the signal changes too rapidly
Option B:	the signal does not change
Option C:	the bit rate is too high
Option D:	the sample is too large

Sr. No.	Q.1 or Q2 or Q3 5 marks each
1	Define modulation and advantages of modulation.
2	Explain block diagram of basic communication system.
3	Explain different types of communication channels.
4	Define noise, noise factor, noise figure, noise temperature
5	Explain different types of noise.
6	Compare different modulation techniques of AM
7	Compare different modulation techniques of FM
8	Calculate power saving in DSBSC/SSB AM.
9	Explain Ring Modulator.
10	Compare AM, FM and PM.
11	Compare narrowband and wideband FM.
12	Compare AM and FM receivers.
13	Compare Delta and Adaptive delta modulation.
14	Explain with block diagram TDM.
15	Explain with block diagram FDM.
16	Compare TDM and FDM.
17	Explain different types of AGC.
18	Explain Sampling theorem.
19	Explain aliasing error and aperture effect.
20	Explain Nyquist criteria.

Sr. No.	Q.1 or Q2 or Q3 10 marks each
1	Draw and explain frequency allocation table of international communication standards.
2	Derive Friss transmission formula
3	Explain with applications ISB and VSB
4	Explain different methods for generation of DSBFC/DSBSC/SSB
5	Explain Foster Seeley discriminator.
6	Explain ARMSTRONG method of FM generation.
7	Explain noise triangle in FM and pre-emphasis and De-emphasis

8	Explain SHR (Super heterodyne receiver) with its advantages over TRF.
9	Explain performance parameters (characteristics) of receivers.
10	Why IF of AM is 455KHZ? Also explain AGC and its different types.
11	Determine noise figure using Friss formula if G1=15dB, F1=10db and F2=20db. Also calculate noise voltage and noise power at temperature 290^0K, Bandwidth 5MHz and resistor 50ohm.
12	One input to AM modulation is 500 KHz carries with an amplitude of 20Vp. The second input is 10 KHz modulating signal that is of sufficient amplitude to cause a change in o/p wave of ± 7.5 Vp. Determine: 1. Upper and Lower side frequencies 2. Modulation co-efficient and % modulation 3. Expression of modulated wave 4. Draw o/p spectrum 5. Total transmitted power and power saving in SSB
13	In an FM system if the maximum value of deviation is 75KHz and the maximum modulating frequency is 10KHz. calculate the deviation ratio and bandwidth of the system.
14	Explain FM receivers.
15	Explain PAM /PWM/PPM modulator and demodulator, also give its advantages, disadvantages and applications.
16	Explain Delta and adaptive delta modulation with its advantages and disadvantages and applications.
17	Explain PCM and DPCM.
18	Explain Sampling theorem and Nyquist criteria.
19	Explain aliasing error and aperture effect.
20	Explain advantages, disadvantages and applications of TDM and FDM with receiver block diagram.