ES Exam >2012

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

T.B.C. : R-FTF-M-FUB **Test Booklet Series**

Serial

A

TEST BOOKLET
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Paper II

Time Allowed : Two Hours ***Maximum Marks : 200***

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES ***NOT*** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES **A, B, C,** OR **D** AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. ***DO NOT*** write ***anything else*** on the Test Booklet.
4. This Test Booklet contains **120** items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose ***ONLY ONE*** response for each item.
5. You have to mark all your responses ***ONLY*** on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator ***only the Answer Sheet.*** You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong answers :**

    THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.

    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0·33)** of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.

    (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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1. Match List I with List II and select the correct answer using the code given below the lists :

List I	*List II*
A. Tuned circuits	1. Schottky diode
B. Voltage reference	2. Varactor diode
C. High frequency switch	3. PIN diode
D. Current controlled attenuator	4. Zener diode

Code :

	A	B	C	D
(a)	2	4	1	3
(b)	3	4	1	2
(c)	2	1	4	3
(d)	3	1	4	2

2. A bipolar junction transistor with forward current transfer ratio $\alpha = 0{\cdot}98$, when working in CE mode, provides current transfer ratio β as

(a) 98

(b) 0·02

(c) 49

(d) 0·49

3. A BJT is biased with a power supply of 12 V. For minimum heat dissipation, the drop across the transistor will be

(a) 6 V

(b) 9 V

(c) 12 V

(d) > 9 V but < 12 V

4. A transistor is said to be useful to be configured as an amplifier when its β is

(a) Less than 0

(b) Between 0 and 1

(c) Between 1 and 50

(d) > 50

5. In a transistor biased in the active region, thermal runway is due to

(a) Base emitter voltage V_{BE} which decreases with rise in temperature

(b) Change in reverse collector saturation current due to rise in temperature

(c) Heating of the transistor

(d) Changes in β which increases with temperature

6. A change in the value of the emitter resistance R_e in a differential amplifier

(a) Affects the difference mode gain, A_d

(b) Affects the common mode gain, A_c

(c) Affects both A_d and A_c

(d) Does not affect either A_d or A_c

7. An output signal of a power amplifier has amplitudes of 2·5 V fundamental, 0·25 V second harmonic and 0·1 V third harmonic. The total percentage harmonic distortion of the signal is

(a) 12·8%

(b) 10·8%

(c) 6·4%

(d) 1·4%

8. The lower 3 dB frequency of an n-stage amplifier with non-interacting stages is given by

(a) $\frac{f_L}{\sqrt{2^{\frac{1}{n}} - 1}}$

(b) $f_L \left[\sqrt{2^{\frac{1}{n}} - 1}\right]$

(c) $\frac{f_L}{\sqrt{2^{\frac{1}{n}} - n}}$

(d) $f_L \left[\sqrt{2^{\frac{1}{n}} - n}\right]$

where f_L is the 3 dB frequency of a single stage.

9. The second-harmonic component in the output of a transistor amplifier, without feedback, is B_2. The second harmonic component, with negative feedback B_2' is equal to (where A = Amplifier gain and β = feedback factor)

(a) $\frac{B_2}{1 + A\beta}$

(b) $B_2(1 + A\beta)$

(c) $\frac{B_2}{\beta}$

(d) $\frac{B_2}{A\beta}$

10. For a full wave rectifier, with sinusoidal input and inductor as filter, ripple factor for maximum load current and minimum load current conditions are respectively

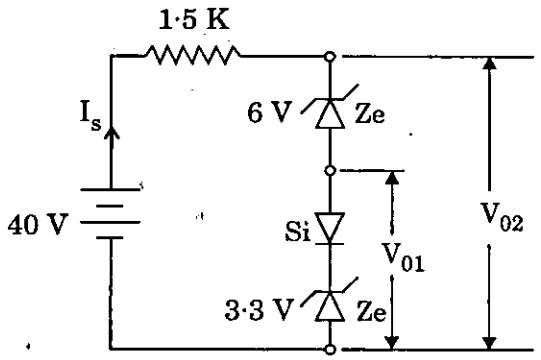
(a) 0·1 and 1

(b) 0·1 and 0·47

(c) 0 and 0·47

(d) 0 and 0·22

11.



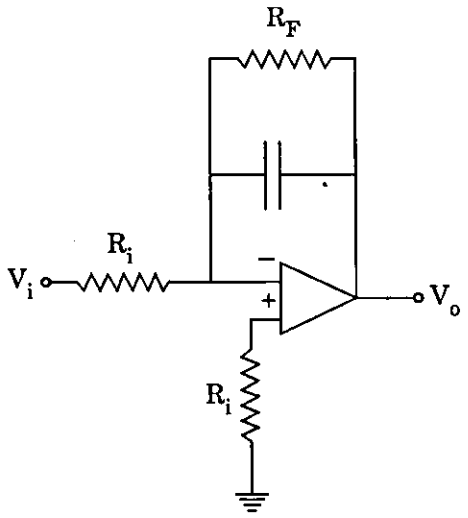
A 40 V dc supply is connected across the network comprising of zener and silicon diodes as shown. The regulated voltages V_{01}, V_{02} and source current I_s are

(a) 2·4 V, 5·1 V and 21·7 mA

(b) 3 V, 6 V and 22·7 mA

(c) 3·3 V, 9·3 V and 20·5 mA

(d) 4 V, 10 V and 20 mA

12. 

In the circuit shown, the need of the resistor R_F is

(a) To increase the overall gain

(b) To stabilize the circuit

(c) To increase input impedance

(d) To prevent saturation

13. For a transistor used as a switch, t_d is delay time, t_r is rise time, t_s is storage time and t_f is fall time. Then turn-on time t_{ON} and turn-off time t_{OFF} are respectively

(a) $(t_d + t_s)$ and $(t_r + t_f)$

(b) $(t_d + t_f)$ and $(t_s + t_r)$

(c) $(t_r + t_s)$ and $(t_d + t_f)$

(d) $(t_d + t_r)$ and $(t_s + t_f)$

14. Simplified form of the logic expression

$(A + \overline{B} + C)\ (A + \overline{B} + \overline{C})\ (A + B + C)$ is

(a) $\overline{A}B + \overline{C}$

(b) $A + \overline{B}C$

(c) A

(d) $AB + \overline{C}$

15. Binary data is being represented in size of byte and in 2's complement form. The number of 0's present in representation of $(-127)_{decimal}$ is

(a) 8

(b) 7

(c) 6

(d) 5

16. The correct expression is

(a) $\overline{A}B + A\overline{B} = \overline{\overline{A}B}(A + B)$

(b) $\overline{A}B + \overline{A}B = AB(\overline{A} + \overline{B})$

(c) $\overline{A}B + A\overline{B} = AB(\overline{A} + \overline{B})$

(d) $\overline{A}B + \overline{A}B = \overline{\overline{A}B}(A + B)$

17. The figure of merit of a logic family is given by

(a) Gain bandwidth product

(b) (Propagation delay time) × (Power dissipation)

(c) (Fan-out) × (Propagation delay time)

(d) (Noise-margin) × (Power dissipation)

18. Match List I with List II and select the correct answer using the code given below the lists :

List I	*List II*
A. HTL	1. High fan-out
B. CMOS	2. Highest speed of operation
C. I^2L	3. High noise immunity
D. ECL	4. Lowest product of power and delay

Code :

	A	B	C	D
(a)	3	4	1	2
(b)	2	4	1	3
(c)	3	1	4	2
(d)	2	1	4	3

19. If a feedback control system has its open-loop transfer function

$$G(s)\,H(s) = \frac{K}{[s(s+2)(s^2+2s+5)]}$$

the coordinates of the centroid of the asymptotes of its root-locus are

(a) -1 and 0

(b) 1 and 0

(c) 0 and -1

(d) 0 and 1

20. In locations where the humidity is low, ICs based on one of the following technologies should be handled only after grounding the body. The technology is

(a) TTL

(b) CMOS

(c) DTL

(d) I^2L

21. Assuming that only logic inputs X and Y are available and their complements $\overline{X}$ and $\overline{Y}$ are not available, the minimum number of two-input NAND gates required to implement $X \oplus Y$ would be

(a) 2

(b) 3

(c) 4

(d) 5

22. The minimum number of NAND gates required to implement $A + A\overline{B} + A\overline{B}C$ is equal to

(a) Zero

(b) 1

(c) 4

(d) 7

23. The type of device used to interface a parallel data format with external equipment's serial format is

(a) Key matrix

(b) UART

(c) Memory chip

(d) Serial-in, parallel-out

24. A bistable multi-vibrator that functions as a voltage comparator with hysteresis is called

(a) T flip-flop

(b) D flip-flop

(c) J-K flip-flop

(d) Schmitt trigger

25. The characteristic equation of the T flip-flop is given by

(a) $Q_{n+1} = TQ_n$

(b) $Q_{n+1} = T\overline{Q}_n + Q_n\overline{T}$

(c) $Q_{n+1} = \overline{T}Q_n$

(d) $Q_{n+1} = T\overline{Q}_n$

26. A pulse train with a frequency of 1 MHz is counted using a mod-1024 ripple counter built with J-K flip-flops. For proper operation of the counter the maximum permissible propagation delay per flip-flop stage is

(a) 100 ns

(b) 50 ns

(c) 20 ns

(d) 10 ns

27. The highest speed counter is

(a) Asynchronous counter

(b) Synchronous counter

(c) Ripple counter

(d) Ring counter

28. An analog voltage of 3·41 V is converted into 8-bit digital form by an A/D converter with a reference voltage of 5 V. The digital output is

(a) 1001 1001

(b) 1111 0001

(c) 1011 0111

(d) 1010 1110

29. Match List I with List II and select the correct answer using the code given below the lists :

List I	*List II*
A. 555	1. Microcontroller
B. 74173	2. Register
C. 74163	3. Timer
D. 8097	4. Counter

Code :

	A	B	C	D
(a)	3	4	2	1
(b)	1	4	2	3
(c)	3	2	4	1
(d)	1	2	4	3

30. In which of the following types of A/D converter does the conversion time almost double for every bit added to the device ?

(a) Counter type A/D converter

(b) Tracking type A/D converter

(c) Single-slope integrating type A/D converter

(d) Successive approximation type A/D converter

31. If both inputs of S-R NAND latch are low, the output will be

(a) Unpredictable

(b) Toggle

(c) Reset

(d) Remain same

32. A 10-bit DAC provides an analog output which has a maximum value of 10·23 volts. Resolution of the DAC is

(a) 10 mV

(b) 15 mV

(c) 20 mV

(d) 40 mV

33. Consider the following statements regarding registers and latches :

1. Registers are temporary storage devices, whereas latches are not.

2. A latch employs cross-coupled feedback connections.

3. A register stores a binary word, whereas a latch does not.

The correct statement(s) is/are

(a) 1 only

(b) 2 only

(c) 1 and 3

(d) 2 and 3

34. Match List I with List II and select the correct answer using the code given below the lists :

List I	*List II*
A. Flash converter ADC	1. Integrating type
B. Successive approximation ADC	2. Fast conversion
C. Counter ramp ADC	3. Maximum conversion clock periods = Number of bits
D. Dual slope ADC	4. Uses a DAC in its feedback path

Code :

	A	B	C	D
(a)	2	3	4	1
(b)	1	3	4	2
(c)	2	4	3	1
(d)	1	4	3	2

35. A 12-bit ADC is operating with a 1 μs clock period and total conversion time is seen to be 14 μs. The ADC must be of

(a) Flash type

(b) Counting type

(c) Integrating type

(d) Successive approximation type

36. The type of system which is used for determination of static error constants is determined from the number of

(a) Zeros at origin for open loop transfer function

(b) Poles at origin for open loop transfer function

(c) Zeros at origin for closed loop transfer function

(d) Poles at origin for closed loop transfer function

37. The time taken for the output to settle within ±2% of step input for the control system represented by $\frac{25}{s^2+5s+25}$ is given by

(a) 1·2 s

(b) 1·6 s

(c) 2·0 s

(d) 0·4 s

38. The following quantities give a measure of the transient characteristics of a control system, when subjected to unit step excitation :

1. Maximum overshoot
2. Maximum undershoot
3. Overall gain
4. Delay time
5. Rise time
6. Fall time

(a) 1, 3 and 5

(b) 2, 4 and 5

(c) 2, 4 and 6

(d) 1, 4 and 5

39. In a feedback control system, if $G(s) = \frac{4}{s(s+3)}$ and $H(s) = \frac{1}{s}$, then the closed-loop system will be of type

(a) 3

(b) 2

(c) 1

(d) 0

40. For a second order dynamic system, if the damping ratio is 1 then the poles are

(a) Imaginary and complex conjugate

(b) In the right-half of s-plane

(c) Equal, negative and real

(d) Negative and real

41. The range of K for stability of a unity feedback system whose open-loop transfer function is $G(s) = \frac{K}{s(s+1)(s+2)}$ is

(a) $0 < K < 3$

(b) $0 < K < 6$

(c) $K > 6$

(d) $0 > K > 3$

42. The sensitivity $S_T(K)$ of transfer function $T = \frac{(1+2K)}{(3+4K)}$ with respect to the parameter K is given by

(a) $\frac{K}{3+K^2}$

(b) $\frac{3K}{2+4K+K^2}$

(c) $\frac{2K}{3+10K+8K^2}$

(d) $\frac{4K}{2+5K+7K^2}$

43. A system is described by the transfer function $G(s) = \frac{2s+5}{(s+5)(s+4)}$. The dc gain of the system is

(a) 0·25

(b) 0·5

(c) 1

(d) ∞

44. If root loci plots of a particular control system do not intersect the imaginary axis at any point, then the gain margin of the system will be

(a) Zero

(b) 0·707

(c) 1·0

(d) Infinite

45. The characteristic equation of a particular system is given by $s^3 + 2s^2 + 6s + 12 = 0$. The damping ratio δ will be

(a) $\delta = 0$

(b) $0 < \delta < 1$

(c) $\delta = 1$

(d) $\delta > 1$

46. For a type 1 system, the low frequency asymptote of its Bode plot will have a slope of

(a) 0 dB/decade

(b) 6 dB/decade

(c) 20 dB/decade

(d) – 20 dB/decade

47. The gain cross-over frequency and phase margin of the transfer function $\frac{1}{s(s+1)}$ are

(a) 1 rad/s and 45°

(b) 2 rad/s and 45°

(c) 2 rad/s and 135°

(d) 1 rad/s and 135°

48. For a unity feedback control system, if its open-loop transfer function is given by $G(s)\,H(s) = \frac{10}{(s+5)^3}$, then its gain margin will be

(a) 20 dB

(b) 40 dB

(c) 60 dB

(d) 80 dB

49. All the constant – N loci in G-plane intersect the real axis in points

(a) – 1 and origin

(b) – 0·5 and + 0·5

(c) – 1 and + 1

(d) Origin and + 1

50. The constant magnitude locus for M = 1, in G-plane is given by the following equation where $x = \text{Re}[G(j\omega)]$ and $y = \text{Im}[G(j\omega)]$

(a) $x = -0{\cdot}5$

(b) $x = 0$

(c) $x^2 + y^2 = 0{\cdot}25$

(d) $x^2 + y^2 = 1$

51. A third order system is approximated to an equivalent second order system. The rise time of this approximated system will be

(a) Same as the original system for any input

(b) Smaller than the original system for any input

(c) Larger than the original system for any input

(d) Smaller or larger depending on the type of input

52. A phase lead compensating network has its transfer function $G_c(s) = \frac{10(1+0{\cdot}04s)}{(1+0{\cdot}01s)}$. The maximum phase lead occurs at a frequency of

(a) 50 rad/s

(b) 25 rad/s

(c) 10 rad/s

(d) 4 rad/s

53. Match List I with List II and select the correct answer using the code given below the lists :

List I	*List II*
A. PI control	1. Relay controller
B. PD control	2. Lead lag compensator
C. PID control	3. Lead compensator
D. On-off control	4. Lag compensator

Code :

	A	B	C	D
(a)	4	2	3	1
(b)	1	2	3	4
(c)	4	3	2	1
(d)	1	3	2	4

54. Considering the filtering property, the lead compensators and lag compensators are categorized respectively as

(a) Low pass and high pass filters

(b) High pass and low pass filters

(c) High pass and high pass filters

(d) Low pass and low pass filters

55. The necessary conditions for poles and zeros of the transfer function of a bridge-T network containing only resistors and capacitors and used as a compensator are

(a) All the poles and zeros must be imaginary

(b) Poles and zeros both can be complex

(c) Poles can be complex but zeros must be real

(d) Zeros can be complex but poles must be real

56. A liquid level controller linearly converts a displacement of 2 m to 3 m into 4 – 20 mA control signal. A relay serves as two position controller to open and close an inlet valve. Relay closes at 12 mA and opens at 10 mA. The hysteresis zone is

(a) 0·1 m

(b) 0·125 m

(c) 0·15 m

(d) 0·2 m

57. A proportional integral (PI) controller results in which of the following ?

(a) Improves the transient response without affecting steady state response

(b) Improves the steady state response without affecting transient response

(c) Improves both transient response and steady state response

(d) Improves the steady state response while marginally affecting transient response, for well designed control parameters

58. The effect of integral controller on the steady state error (e_{ss}) and on the relative stability (R_s) of the system are

(a) Both are increased

(b) e_{ss} is increased but R_s is reduced

(c) e_{ss} is reduced but R_s is increased

(d) Both are reduced

59. The average information associated with an extremely likely message is zero. What is the average information associated with an extremely unlikely message ?

(a) Zero

(b) Infinity

(c) Depends on total number of messages

(d) Depends on speed of transmission of the message

60. The spectral density and autocorrelation function of white noise is

(a) Delta and uniform

(b) Uniform and delta

(c) Gaussian and uniform

(d) Gaussian and delta

61. The threshold effect in demodulators is

(a) The rapid fall of output SNR when the input SNR falls below a particular value

(b) Exhibited by all the demodulators when the input SNR is low

(c) Exhibited by all AM suppressed carrier coherent demodulators

(d) Exhibited by correlation receivers

62. An amplitude modulated signal is $[A + 0{\cdot}5 A \cos \omega_m t] \cos \omega_c t$ where ω_m and ω_c are respectively, modulating and carrier frequencies. The power efficiency is

(a) 11·11%

(b) 0·25%

(c) 4·32%

(d) 50%

63. The signal $x(t) = \sin (200 \pi t) + 2 \sin (400 \pi t)$ is modulated to produce a signal

$$g(t) = x(t) \sin (400 \pi t).$$

This is passed through a low pass filter having a cut-off frequency of 400 π Hz and passband gain of 2. Then the output signal after the filter is

(a) 0

(b) $0{\cdot}5 \sin (200 \pi t)$

(c) $\sin (200 \pi t)$

(d) $2 \sin (200 \pi t)$

64. In communication systems, noise due to quantization error is

(a) Linear and signal dependent

(b) Non-linear and signal dependent

(c) Linear and signal independent at low frequencies only

(d) Non-linear and signal dependent at low frequencies only

65. Match List I with List II and select the correct answer using the code given below the lists :

List I	*List II*
A. Characteristic impedance	1. $\nabla \cdot D = \rho_V$
B. Poynting vector	2. $\sqrt{\frac{j\omega\mu}{(\sigma + j\omega\varepsilon)}}$
C. Displacement current	3. $E \times H$
D. Point form of Gauss law	4. $\frac{\partial D}{\partial t}$

Code :

	A	B	C	D
(a)	2	3	4	1
(b)	1	3	4	2
(c)	2	4	3	1
(d)	1	4	3	2

66. For an earth station transmitter, with an antenna output power of 40 dBW (10,000 W), a back-off loss of 3 dB, a total branching and feeder loss of 3 dB and transmit antenna gain of 4 dB, the effective isotropic radiated power (EIRP) will be

(a) 38 dBW

(b) 40 dBW

(c) 36 dBW

(d) 47 dBW

67. A coherent binary phase-shift-keyed (BPSK) transmitter operates at a bit rate of 20 Mbps. For a probability of error P(e) of 10^{-4} and given carrier-to-noise (C/N) density ratio of 8·8 dB, determine energy of bit-to-noise (E_b/N_o) density ratio for a receiver bandwidth equal to the minimum double-sided Nyquist bandwidth.

(a) 23 dB

(b) 2·3 dB

(c) 8·8 dB

(d) 0·88 dB

68. An elliptically (arbitrarily) polarized wave can be broken up into

(a) Two circularly polarized components rotating in same direction

(b) Two circularly polarized components rotating in opposite directions

(c) Two stationary circularly polarized components

(d) None of these

69. Klystron operation is based on the principle of

(a) Velocity modulation

(b) Amplitude modulation

(c) Frequency modulation

(d) Phase modulation

70. The following is ***not*** an application of varactor diode :

(a) Parametric amplifier

(b) Frequency tuner

(c) Voltage controlled oscillator

(d) Phase shifter

71. The following quantity is ***not*** required in the calculation of Q of a cavity resonator :

(a) Energy stored

(b) Power dissipated

(c) Loss in radiation

(d) Dimensions of the cavity

72. When electromagnetic waves are propagated in a waveguide

(a) They travel along the walls of the waveguide

(b) They travel through the dielectric without touching the walls

(c) They are reflected from the walls but do not travel along the walls

(d) None of these

73. Slotted line with tunable probe is ***not*** used to measure

(a) VSWR

(b) Wavelength

(c) Power

(d) Impedance

74. In a microwave magic-T, E plane and H plane are

(a) In phase

(b) Out of phase

(c) Isolated

(d) 90° out of phase

75. Baratters and bolometers are used for measurement of

(a) VSWR

(b) Transmission losses

(c) Microwave power

(d) Frequency

76. Magnetic properties of ferrites result mainly from

(a) Polarization of electromagnetic waves

(b) Dielectric behaviour of ferrite

(c) Magnetic dipole moment associated with the electron spin

(d) External magnetic fields

77. A communication link is to be set up between two stations 100 km apart using $\frac{\lambda}{2}$ antennae to transmit 1 kW power. The operating frequency is 100 MHz and the directivity of the two antennae is 1·64. The maximum received power would be

(a) $3{\cdot}06 \times 10^{-8}$ W

(b) $1{\cdot}53 \times 10^{-8}$ W

(c) $6{\cdot}12 \times 10^{-9}$ W

(d) 1×10^{-9} W

78. In the ionosphere layer, the lowest frequency signal that penetrates the layer upon vertical incidence is given by

(a) $f_L = 81\ N_{Max}$

(b) $f_L = 81\ N_{Max}^2$

(c) $f_L = \sqrt{81\ N_{Max}}$

(d) $f_L = 81\sqrt{N_{Max}}$

79. An 8085 microprocessor executes the following instructions :

Two numbers are represented in signed 2's complement form as

P = 11101101 and Q = 11100110

If Q is subtracted from P, the value obtained in signed 2's complement form is

(a) 100000111

(b) 00000111

(c) 11111001

(d) 011111001

80. If $(11X1Y)_8 = (12C9)_{16}$ then the values X and Y are

(a) 5 and 1

(b) 5 and 7

(c) 7 and 5

(d) 1 and 5

81. A binary tree T has n leaf nodes. The number of nodes of degree 2 in T is

(a) $\log_2 n$

(b) $n - 1$

(c) n

(d) 2^n

82. The data structure needed to convert infix notation to prefix notation is

(a) Queue

(b) Stack

(c) Tree

(d) Graph

83. In case the code is position dependent, the most suitable addressing mode is

(a) Direct mode

(b) Indirect mode

(c) Relative mode

(d) Indexed mode

84. The ***incorrect*** match (when n > 1) is

(a) SISD Model of computer : 1 control unit and 1 ALU

(b) SIMD Model of computer : 1 control unit and n ALUs

(c) MISD Model of computer : n control units and n ALUs

(d) MIMD Model of computer : n control units and 1 ALU

85. The following register holds the instruction before it goes to the decoder :

(a) Control register

(b) Accumulator

(c) Address register

(d) Data register

86. Among memory types, the abbreviation MPDRAM stands for

(a) Multiport Dynamic Random Access Memory

(b) Multipoint Dynamic Random Access Memory

(c) Multipoint Disk Random Access Memory

(d) Multiport Dimensional Random Access Memory

87. A virtual memory system has an address space of 8 k words, a memory space of 4 k words and page and block sizes of 1 k words. The number of page faults using LRU policy, for following page references is

1 0 2 4 6 2 1 5 7 0 0

(a) 5

(b) 7

(c) 9

(d) 10

88. The access time of a cache memory is 100 ns and that of main memory is 1 ms. 80% of the memory requests are for read and others are for write. Hit ratio for read only accesses is 0·9. A write through procedure is used. The average access time of the system for both read and write requests is

(a) 200 ns

(b) 360 ns

(c) 720 ns

(d) 1100 ns

89. Consider the following statements for a DRAM :

1. Bit is stored as a charge.
2. It is made of MOS transistors.
3. Speed of DRAM is faster than processors.
4. Each memory cell requires six transistors.

Which of these statements are correct ?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 3 and 4 only

(d) 1, 2, 3 and 4

90. A memory system has a total of 8 memory chips, each with 12 address lines and 4 data lines. The size of the memory system is

(a) 16 k bytes

(b) 32 k bytes

(c) 48 k bytes

(d) 64 k bytes

91. In a microprocessor, the service routine for a certain interrupt starts from a fixed location of memory which cannot be externally set, but the interrupt can be delayed or rejected. Such an interrupt is

(a) Non-maskable and non-vectored

(b) Maskable and non-vectored

(c) Non-maskable and vectored

(d) Maskable and vectored

92. For Opcode fetch operation in 8085 microprocessor

(a) $S_1 = 0, S_2 = 1, \overline{RD} = 0$, ALE high in T_1

(b) $S_1 = 1, S_2 = 1, \overline{RD} = 0$, ALE high in T_1

(c) $S_1 = 1, S_2 = 1, \overline{RD} = 0$, ALE high in T_2

(d) $S_1 = 0, S_2 = 1, \overline{RD} = 0$, ALE high in T_2

93. While executing a program, 8085 microprocessor completes fetching of instruction JMP 2050 stored at address 2057 H. The contents of the program counter after fetching the instruction would be

(a) 2050 H

(b) 2057 H

(c) 205A H

(d) 2051 H

94. The action performed by the following instruction of 8086 :

mov [1234h], AX

(a) Move contents of memory location 1234h to register AX

(b) Move the contents of register AX to memory offset 1234h

(c) Add contents at 1234h to register AX

(d) Add contents of 1234h and AX and store the result in 1234h

95. For 8086 microprocessor, the jump distance in bytes for short jump range is

(a) Forward 255 and Backward 256

(b) Forward 127 and Backward 128

(c) Forward 31 and Backward 32

(d) Forward 15 and Backward 16

96. The Boolean equation $X = [(A + \overline{B})\ (B + C)]B$ can be simplified to

(a) $X = \overline{A}B$

(b) $X = A\overline{B}$

(c) $X = AB$

(d) $X = \overline{A}\ \overline{B}$

97. Match List I with List II and select the correct answer using the code given below the lists :

List I	*List II*
A. Immediate addressing	1. LDA 30FF
B. Implicit addressing	2. MOV A, B
C. Register addressing	3. LXI H, 2050
D. Direct addressing	4. RRC

Code :

	A	B	C	D
(a)	3	4	2	1
(b)	1	4	2	3
(c)	3	2	4	1
(d)	1	2	4	3

98. An Intel 8085 processor is executing the program given below :

```
      MVI A, 10H
      MVI B, 10H
BACK : NOP
      ADD B
      RLC
      JNC BACK
      HLT
```

The number of times that the operation NOP will be executed is

(a) 1

(b) 2

(c) 3

(d) 4

99. Following program finds absolute value of N :

```
    MVI A, N
    ORA A
    JM ONE
    OUT 01H
    HLT
ONE : (P)
    (Q)
    OUT 01H
    HLT
```

The instructions of (P) and (Q) must be

(a) CMA and ADI 0H

(b) CMC and ADI 0H

(c) INR A and CMC

(d) INR A and CMA

100. A small code of 8085 as given below, is executed

```
MVI A, 7FH
ORA A
CPI A2H
```

The contents of the accumulator and flags after execution are

(a) A = DD, S = 1, Z = 0, CY = 0

(b) A = 7F, S = 1, Z = 0, CY = 1

(c) A = DD, S = 0, Z = 1, CY = 0

(d) A = 7F, S = 0, Z = 1, CY = 1

101. For the 8085 assembly language program given below, the content of the accumulator after the execution of the program is

```
3000  MVI  A, 45H
3002  MOV B, A
3003  STC
3004  CMC
3005  RAR
3006  XRA  B
3007  HLT
```

(a) 00 H

(b) 45 H

(c) 67 H

(d) E7 H

102. The 8254 Programmable Interval Timer is set to work in MODE 5. The following would best describe its function :

(a) Software triggered strobe

(b) Hardware triggered strobe

(c) Square wave generator

(d) Interrupt on terminal count

103. To configure port A and port B as output ports, port C not being used in the 8155 programmable interface, the control word should have the value

(a) 03H

(b) 01H

(c) 02H

(d) 60H

104. The 8085 microprocessor instructions with required number of T states are given below. Which pair is correctly matched ?

(a) STAX : 8 T-states

(b) SPHL : 6 T-states

(c) SIM : 7 T-states

(d) STA : 12 T-states

105. The crystal frequency of 8085 microprocessor is 6 MHz. The time required to execute instruction XTHL over this microprocessor is

(a) 5·33 μsec

(b) 10·67 μsec

(c) 4·33 μsec

(d) 8·67 μsec

106. In 8085 microprocessor, after the execution of RST 5 instruction, the program control shifts to

(a) 0030 H

(b) 0005 H

(c) 0028 H

(d) 0024 H

107. Consider the following 8085 interrupts :

1. TRAP
2. INTR
3. RST 6
4. RST 7·5
5. RST 0

The software interrupts are

(a) 1 and 3 only

(b) 2 and 5 only

(c) 3 and 5 only

(d) 1, 2, 3, 4 and 5

Directions : *Each of the next thirteen (13) items consists of two statements, one labelled as the 'Statement (I)' and the other as 'Statement (II)'. You are to examine these two statements carefully and select the answers to these items using the codes given below :*

Codes :

(a) Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)

(b) Both Statement (I) and Statement (II) are individually true but Statement (II) is ***not*** the correct explanation of Statement (I)

(c) Statement (I) is true but Statement (II) is false

(d) Statement (I) is false but Statement (II) is true

108. *Statement (I) :* In a transistor designed to be used for power amplification, the collector size is largest relative to the emitter and base.

Statement (II) : The collector is connected to the body of the transistor and hence to a heat sink for heat dissipation to be effective.

109. *Statement (I) :* The carry look-ahead adder is a fast adder.

Statement (II) : The carry look-ahead adder generates the carry and the sum digits directly.

110. *Statement (I) :* Root loci are symmetrical with respect to real axis of the s-plane.

Statement (II) : Root loci are normally symmetrical with respect to the perpendicular axis of symmetry of the pole-zero combination of the loop transfer function.

111. *Statement (I) :* Nyquist criterion is a powerful tool to determine stability of a closed loop system using open loop transfer function.

Statement (II) : Nyquist criterion relates the locations of poles and zeros of the closed loop transfer function.

112. *Statement (I) :* A second order system subjected to a unit impulse oscillates at its natural frequency.

Statement (II) : Impulse input contains frequencies from $-\infty$ to $+\infty$.

113. *Statement (I) :* All the systems which exhibit overshoot in transient response will also exhibit resonance peak in frequency response.

Statement (II) : A large resonance peak in frequency response corresponds to a large overshoot in transient response.

114. *Statement (I) :* In a prototype second order system the rise time t_r and bandwidth are inversely proportional.

Statement (II) : Increasing ω_n increases bandwidth while t_r reduces.

115. *Statement (I) :* The phase angle plot in Bode diagram is not affected by the variation in open loop gain of the system.

Statement (II) : The variation in gain of the system has no effect on the phase margin.

116. *Statement (I) :* FM spectrum consists of a carrier and an infinite number of side band components.

Statement (II) : FM signals are used only in TV transmission to ensure better picture quality.

117. *Statement (I) :* In the two body system consisting of the earth and a satellite, centre of mass always coincides with centre of the earth.

Statement (II) : Mass of earth is much greater than mass of satellite.

118. *Statement (I) :* Gunn effect device is a slice made from n-doped GaAs and provides negative resistance characteristics.

Statement (II) : GaAs has an empty energy band higher in energy than the filled or partly filled bands.

119. *Statement (I) :* Power output of the lowest mode in a reflex klystron is maximum.

Statement (II) : Lower modes occur at higher repeller voltages where the acceleration of bunched electrons on return is maximum.

120. *Statement (I) :* The DMA technique is more efficient than the Interrupt-driven technique for high volume I/O data transfer.

Statement (II) : The DMA technique does not make use of the Interrupt mechanism.

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