

प्रश्न-पुस्तिका संख्या व बारकोड /
 Question Booklet No. & Barcode

इस प्रश्न-पुस्तिका को तब तक न खोलें जब तक
 कहा न जाए। Do not open this Question
 Booklet until you are asked to do so.

पुस्तिका में पृष्ठों की संख्या : 24
 Number of Pages in Booklet : 24
 पुस्तिका में प्रश्नों की संख्या : 150
 No. of Questions in Booklet : 150

Paper Code : 05

Sub : Electronics & Communication Engineering

समय : 02:30 घण्टे + 10 मिनट अतिरिक्त*

Time : 02:30 Hours + 10 Minutes Extra*

Exam Date 30/07/2025 अधिकतम अंक : 150
 Maximum Marks : 150

प्रश्न-पुस्तिका के पेपर की सील/पॉलिथीन बैग को खोलने पर प्रश्न-पत्र हल करने से पूर्व परीक्षार्थी यह सुनिश्चित कर लें कि :

- प्रश्न-पुस्तिका संख्या तथा ओ.एम.आर. उत्तर-पत्रक पर अंकित बारकोड संख्या समान हैं।
- प्रश्न-पुस्तिका एवं ओ.एम.आर. उत्तर-पत्रक के सभी पृष्ठ व सभी प्रश्न सही मुद्रित हैं। समस्त प्रश्न, जैसा कि ऊपर वर्णित है, उपलब्ध हैं तथा कोई भी पृष्ठ कम नहीं है/ मुद्रण त्रुटि नहीं है। किसी भी प्रकार की विसंगति या दोषपूर्ण होने पर परीक्षार्थी वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें। यह सुनिश्चित करने की जिम्मेदारी अभ्यर्थी की होगी। परीक्षा प्रारम्भ होने के 5 मिनट पश्चात् ऐसे किसी दावे/आपत्ति पर कोई विचार नहीं किया जायेगा।

On opening the paper seal/polythene bag of the Question Booklet before attempting the question paper, the candidate should ensure that :
 • Question Booklet Number and Barcode Number of OMR Answer Sheet are same.
 • All pages & Questions of Question Booklet and OMR Answer Sheet are properly printed. All questions as mentioned above are available and no page is missing/misprinted.

If there is any discrepancy/defect, candidate must obtain another Question Booklet from Invigilator. Candidate himself shall be responsible for ensuring this. No claim/objection in this regard will be entertained after five minutes of start of examination.

परीक्षार्थियों के लिए निर्देश

1. प्रत्येक प्रश्न के लिये एक विकल्प भरना अनिवार्य है।
2. सभी प्रश्नों के अंक समान हैं।
3. प्रत्येक प्रश्न का मात्र एक ही उत्तर दीजिए। एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा।
4. OMR उत्तर-पत्रक इस प्रश्न-पुस्तिका के अन्दर रखा है। जब आपको प्रश्न-पुस्तिका खोलने को कहा जाए, तो उत्तर-पत्रक निकाल कर ध्यान से केवल नीले बॉल पॉइंट पेन से विवरण भरें।
5. कृपया अपना रोल नम्बर ओ.एम.आर. उत्तर-पत्रक पर सावधानीपूर्वक सही भरें। गलत रोल नम्बर भरने पर परीक्षार्थी स्वयं उत्तरदायी होगा।
6. ओ.एम.आर. उत्तर-पत्रक में करेक्शन पेन/व्हाइटनर/सफेदा का उपयोग निषिद्ध है।
7. प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा। गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है।
8. प्रत्येक प्रश्न के पाँच विकल्प दिये गये हैं, जिन्हें क्रमशः 1, 2, 3, 4, 5 अंकित किया गया है। अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले (बबल) को उत्तर-पत्रक पर नीले बॉल पॉइंट पेन से गहरा करना है।
9. यदि आप प्रश्न का उत्तर नहीं देना चाहते हैं तो उत्तर-पत्रक में पाँचवें (5) विकल्प को गहरा करें। यदि पाँच में से कोई भी गोला गहरा नहीं किया जाता है, तो ऐसे प्रश्न के लिये प्रश्न अंक का 1/3 भाग काटा जायेगा।
- 10.* प्रश्न-पत्र हल करने के उपरांत अभ्यर्थी अनिवार्य रूप से ओ.एम.आर. उत्तर-पत्रक जाँच लें कि समस्त प्रश्नों के लिये एक विकल्प (गोला) भर दिया गया है। इसके लिये ही निर्धारित समय से 10 मिनट का अतिरिक्त समय दिया गया है।
11. यदि अभ्यर्थी 10% से अधिक प्रश्नों में पाँच विकल्पों में से कोई भी विकल्प अंकित नहीं करता है तो उसको अयोग्य माना जायेगा।
12. मोबाइल फोन अथवा अन्य किसी इलेक्ट्रॉनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित है। यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी।

चेतावनी : अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज कराते हुए राजस्थान सार्वजनिक परीक्षा (भर्ती में अनुचित साधनों की रोकथाम अध्यापक) अधिनियम, 2022 तथा अन्य प्रभावी कानून एवं आयोग के नियमों-प्रावधानों के तहत कार्यवाही की जाएगी। साथ ही आयोग ऐसे अभ्यर्थी को भविष्य में होने वाली आयोग की समस्त परीक्षाओं से विवर्जित कर सकता है।

उत्तर-पत्रक में दो प्रतियाँ हैं - मूल प्रति और कार्बन प्रति। परीक्षा समाप्ति पर परीक्षा कक्ष छोड़ने से पूर्व परीक्षार्थी उत्तर-पत्रक की दोनों प्रतियाँ वीक्षक को सौंपेंगे, परीक्षार्थी स्वयं कार्बन प्रति अलग नहीं करें। वीक्षक उत्तर-पत्रक की मूल प्रति को अपने पास जमा कर, कार्बन प्रति को मूल प्रति से कट लाइन से मोड़ कर सावधानीपूर्वक अलग कर परीक्षार्थी को सौंपेंगे, जिसे परीक्षार्थी अपने साथ ले जायेंगे। परीक्षार्थी को उत्तर-पत्रक की कार्बन प्रति चयन प्रक्रिया पूर्ण होने तक सुरक्षित रखनी होगी एवं आयोग द्वारा माँगे जाने पर प्रस्तुत करनी होगी।

INSTRUCTIONS FOR CANDIDATES

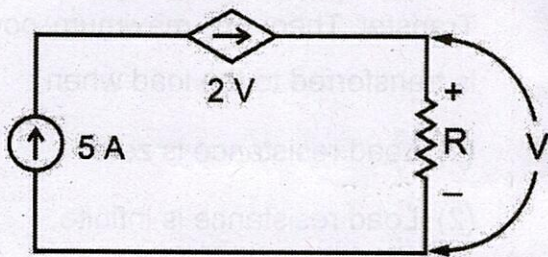
1. It is mandatory to fill one option for each question.
2. All questions carry equal marks.
3. Only one answer is to be given for each question. If more than one answers are marked, it would be treated as wrong answer.
4. The OMR Answer Sheet is inside this Question Booklet. When you are directed to open the Question Booklet, take out the Answer Sheet and fill in the particulars carefully with Blue Ball Point Pen only.
5. Please correctly fill your Roll Number in OMR Answer Sheet. Candidates will themselves be responsible for filling wrong Roll No.
6. Use of Correction Pen/Whitener in the OMR Answer Sheet is strictly forbidden.
7. 1/3 part of the mark(s) of each question will be deducted for each wrong answer. A wrong answer means an incorrect answer or more than one answers for any question.
8. Each question has five options marked as 1, 2, 3, 4, 5. You have to darken only one circle (bubble) indicating the correct answer on the Answer Sheet using BLUE BALL POINT PEN.
9. If you are not attempting a question then you have to darken the circle '5'. If none of the five circles is darkened, one third (1/3) part of the marks of question shall be deducted.
- 10.* After solving question paper, candidate must ascertain that he/she has darkened one of the circles (bubbles) for each of the questions. Extra time of 10 minutes beyond scheduled time, is provided for this.
11. A candidate who has not darkened any of the five circles in more than 10% questions shall be disqualified.
12. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt with as per rules.

Warning : If a candidate is found copying or if any unauthorized material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would be liable to be prosecuted under Rajasthan Public Examination (Measures for Prevention of Unfair means in Recruitment) Act, 2022 & any other laws applicable and Commission's Rules-Regulations. Commission may also debar him/her permanently from all future examinations.

1. The term Variance can be defined by
(When number of observations are greater than 20)
 - (1) $V = \frac{\sum d^2}{n-1}$
 - (2) $V = \frac{\sum d^2}{n}$
 - (3) $V = \sqrt{\frac{\sum d^2}{n}}$
 - (4) $V = \sqrt{\frac{\sum d^2}{n-1}}$
 - (5) Question not attempted
2. Which type of meter is suitable for measuring both AC and DC currents ?
 - (1) Moving-coil meter
 - (2) Moving-iron meter
 - (3) Thermocouple meter
 - (4) Potentiometer
 - (5) Question not attempted
3. Capacitive transducers are normally used for
 - (1) Dynamic measurements
 - (2) Static measurement
 - (3) Transient measurement
 - (4) Static as well as dynamic measurements
 - (5) Question not attempted
4. Piezo-electric transducers are
 - (1) passive transducers
 - (2) active transducers
 - (3) inverse transducers
 - (4) both active & inverse transducers
 - (5) Question not attempted
5. Which sensor uses metals like platinum, whose resistance changes with temperature, to measure temperature accurately in most applications ?
 - (1) LVDT
 - (2) Resistance thermometer (RTD)
 - (3) Capacitive sensor
 - (4) Ultrasonic sensor
 - (5) Question not attempted
6. The Frequency Modulated (F.M.) Telemetry as compared with Amplitude Modulated (A.M.) Telemetry requires a channel that is
 - (1) Equal to that of A.M. Telemetry.
 - (2) 10 times wider of that is required for A.M. Telemetry.
 - (3) 250 times wider of that is required for A.M. Telemetry.
 - (4) Smaller than what is required for A.M. Telemetry.
 - (5) Question not attempted
7. PMMC instrument is suitable for measurement of
 - (1) A.C. or D.C. quantities
 - (2) Only A.C. quantities
 - (3) Only D.C. quantities
 - (4) Only A.C. quantities at higher frequency
 - (5) Question not attempted

8. Which resistive transducer has mostly negative temperature coefficient ?
- (1) Thermocouple
 - (2) RTD
 - (3) Thermistor
 - (4) Both RTD and Thermocouple
 - (5) Question not attempted
9. In the node-voltage method of circuit analysis, which of the following is chosen as a reference node ?
- (1) The node with highest voltage
 - (2) The node with lowest voltage
 - (3) Any node, called the datum or ground node
 - (4) A node connected to the power supply
 - (5) Question not attempted
10. What do Thevenin's and Norton's theorem help to achieve in circuit analysis ?
- (1) Find resonance frequency
 - (2) Replace a complex network with a simple equivalent circuit
 - (3) Analyze non-linear circuits
 - (4) Solve state equations
 - (5) Question not attempted
11. According to the Maximum Power Transfer Theorem, maximum power is transferred to the load when :
- (1) Load resistance is zero.
 - (2) Load resistance is infinite.
 - (3) Load resistance equals source resistance.
 - (4) Source resistance equals zero.
 - (5) Question not attempted
12. What is the condition of symmetry in Y-parameter representation ?
- (1) $Y_{21} = Y_{11}$
 - (2) $Y_{21} = Y_{12}$
 - (3) $Y_{11} = Y_{22}$
 - (4) $Y_{11} = Y_{12}$
 - (5) Question not attempted
13. The Quality Factor (Q) of a series RLC circuit at resonance is given by :
- (1) $Q = (R/L)$
 - (2) $Q = RC$
 - (3) $Q = (1/R)\sqrt{(L/C)}$
 - (4) $Q = (1/R)\sqrt{(C/L)}$
 - (5) Question not attempted

14. Obtain the value of R in the circuit



- (1) $R = 5 \Omega$
- (2) $R = 50 \Omega$
- (3) $R = 0.5 \Omega$
- (4) $R = 0.05 \Omega$
- (5) Question not attempted

15. If the output port of a two-port network is open-circuited, which parameter set can be directly measured from the network ?

- (1) Y-parameters
(Admittance parameters)
- (2) Z-parameters
(Impedance parameters)
- (3) h-parameters
(Hybrid parameters)
- (4) S-parameters
(Scattering parameters)
- (5) Question not attempted

16. When a source is delivering maximum power to a load, the efficiency of the circuit

- (1) is always 50%.
- (2) depends on the circuit parameters.
- (3) is always 75%.
- (4) is always 25%.
- (5) Question not attempted

17. Superposition theorem is not applicable for

- (1) voltage calculations
- (2) bilateral elements
- (3) power relationship
- (4) passive elements
- (5) Question not attempted

18. State equation in standard form can be represented as

- (1) $\dot{x}(t) = A x(t) + B u(t)$
- (2) $\ddot{x}(t) = A x(t) + B u(t)$
- (3) $\ddot{x}(t) = A x(t) + B u(t)$
- (4) $\ddot{x}(t) = A x(t) + B u(t)$
- (5) Question not attempted

19. A lossless transmission line is 80 cm long and operates at a frequency of 600 MHz. The line parameters are $L = 0.25 \mu\text{H/m}$ and $C = 100 \text{ pF/m}$. The phase velocity (in m/s) is :

- (1) 0.5×10^8
- (2) 1.0×10^8
- (3) 2.0×10^8
- (4) 4.0×10^8
- (5) Question not attempted

20. What is the length of the quarter wave transformer (in meters) at 1 MHz if the velocity of propagation is $2/3$ of the speed of light ?

- (1) 200 m
- (2) 150 m
- (3) 100 m
- (4) 50 m
- (5) Question not attempted

21. The wave equation in free space for

the electric field \vec{E} is :

(1) $\nabla^2 \vec{E} = 0$

(2) $\nabla \cdot \vec{E} = 0$

(3) $\nabla^2 \vec{E} = \mu_0 \epsilon_0 \frac{\partial^2 \vec{E}}{\partial t^2}$

(4) $\nabla \cdot \vec{B} = 0$

(5) Question not attempted

22. For skin depth, which of the following statement is not true ?

(1) It is given by the distance δ over which the wave amplitude reduces by $1/e$ or 37%.

(2) It is lower for higher frequency.

(3) It is lower for higher conductivity.

(4) It is higher for higher permeability.

(5) Question not attempted

23. If the scattering matrix $[S]$ of a two-port network is

$$[S] = \begin{bmatrix} 0.15 \angle 0^\circ & 0.85 \angle -45^\circ \\ 0.85 \angle 45^\circ & 0.2 \angle 0^\circ \end{bmatrix}$$

then the network is

(1) lossless and reciprocal

(2) lossless but not reciprocal

(3) not lossless but reciprocal

(4) neither lossless nor reciprocal

(5) Question not attempted

24. A 75Ω resistor is connected to a transmission line of characteristic impedance of 50Ω , what is the VSWR at the termination ?

(1) 1

(2) 1.5

(3) 2

(4) Infinite

(5) Question not attempted

25. Which of the following S-parameters indicates reflection at port 1 ?

(1) S_{21}

(2) S_{12}

(3) S_{11}

(4) S_{22}

(5) Question not attempted

26. For a lossless transmission line, which of the following is true ?

(1) Z_0 has a complex value.

(2) Power is dissipated.

(3) Voltage and current waves do not propagate.

(4) The loss of the line is very small.

(5) Question not attempted

27. In rectangular waveguides, TE_{10} mode is :

(1) Not possible

(2) Dominant TE mode

(3) Has zero cut-off frequency

(4) Only possible at very high frequency

(5) Question not attempted

28. The dominant mode in a rectangular waveguide is TE_{10} , because this mode has
- (1) no magnetic field component
 - (2) no attenuation
 - (3) no cut-off frequency
 - (4) the highest cut-off wavelength
 - (5) Question not attempted
29. What is Laplace transform of $u(t)$? where $u(t)$ is unit step signal.
- (1) 1
 - (2) s
 - (3) $1/s$
 - (4) 0
 - (5) Question not attempted
30. Which statement is incorrect for the signal $x(n) = \cos \sqrt{2}\pi n$?
- (1) The signal does not possess a spectrum.
 - (2) The signal is not periodic.
 - (3) The signal cannot be expanded as Fourier series.
 - (4) The spectral content consists of a single frequency component.
 - (5) Question not attempted

31. Which of the following relation is true if $x[n]$ is real ? $X(e^{j\omega})$ is the Discrete Time Fourier Transform (DTFT) of $x[n]$.
- (1) $X(e^{j\omega}) = X^*(e^{j\omega})$
 - (2) $X(e^{j\omega}) = -X^*(e^{-j\omega})$
 - (3) $X(e^{j\omega}) = X(e^{-j\omega})$
 - (4) $X(e^{j\omega}) = X^*(e^{-j\omega})$
 - (5) Question not attempted
32. Fourier transform of a unit step function, $u(t)$ is
- (1) $\delta(\omega) + \frac{1}{j\omega}$
 - (2) $\frac{\delta(\omega)}{j\omega}$
 - (3) $j\omega + \frac{1}{\delta(\omega)}$
 - (4) $\pi\delta(\omega) + \frac{1}{j\omega}$
 - (5) Question not attempted
33. The Discrete Fourier Transform (DFT) assumes the input signal is :
- (1) Aperiodic and infinite
 - (2) Finite and discrete
 - (3) Continuous and periodic
 - (4) Non-periodic and random
 - (5) Question not attempted

34. The Fast Fourier Transform (FFT) is an efficient algorithm to compute :
- (1) Fourier series
 - (2) z-transform
 - (3) Laplace transform
 - (4) DFT
 - (5) Question not attempted
35. Determine the z-transform of $x(n) = \{1, 2, 5, 7, 0, 1\}$ and the ROC
- (1) $1 + 2z^{-1} + 5z^{-2} + 7z^{-3} + z^{-5}$, ROC : Entire z-plane except $z=\infty$
 - (2) $1 + 2z + 5z^2 + 7z^3 + z^5$, ROC : Entire z-plane except $z=\infty$
 - (3) $1 + 2z^{-1} + 5z^{-2} + 7z^{-3} + z^{-5}$, ROC : Entire z-plane except $z=0$
 - (4) $1 + 2z + 5z^2 + 7z^3 + z^5$, ROC : Entire z-plane except $z=0$
 - (5) Question not attempted
36. When do Discrete Time Fourier Transform (DTFT) and z-transform are equal ?
- (1) The magnitude of the transform variable z is unity.
 - (2) The magnitude of the transform variable z is zero.
 - (3) The real part of the transform variable z is unity.
 - (4) The real part of the transform variable z is zero.
 - (5) Question not attempted
37. Determine the Nyquist rate for the analog signal given by
- $$x(t) = 50 \cos(1000\pi t)$$
- (1) 2000 Hz
 - (2) 500 Hz
 - (3) 1000 Hz
 - (4) 4000 Hz
 - (5) Question not attempted
38. A system is causal if :
- (1) Output depends on future input.
 - (2) Output depends only on past and present inputs.
 - (3) Output is periodic.
 - (4) Output is zero for all time.
 - (5) Question not attempted
39. For a given discrete time linear time-invariant (LTI) system, characterization of stability in terms of impulse response $h[n]$ is
- (1) $\sum_{k=-\infty}^{k=+\infty} |h[k]| > 1$
 - (2) $\sum_{k=-\infty}^{k=+\infty} |h[k]| < 1$
 - (3) $\sum_{k=-\infty}^{k=+\infty} |h[k]| < \infty$
 - (4) $\sum_{k=-\infty}^{k=+\infty} |h[k]| > 0$
 - (5) Question not attempted

40. The overall system impulse response of two LTI systems connected in cascade, in terms of their impulse, is represented by

- (1) Convolution
- (2) Multiplication
- (3) Addition
- (4) Subtraction
- (5) Question not attempted

41. As a function of frequency, the group delay is defined and computed as, (where $\angle [H(j\omega)]$ represent unwrapped phase function corresponding to $H(j\omega)$)

(1) $\tau(\omega) = \frac{-d}{d\omega} \{ \angle [H(j\omega)] \}$

(2) $\tau(\omega) = \frac{-d}{d\omega} \{ \angle [H(j\omega)] \}$

(3) $\tau(\omega) = \frac{d}{d\omega} \{ \angle [H(j\omega)] \}$

(4) 2π

(5) Question not attempted

42. Which property of the autocorrelation function is not correct ?

- (1) $R_X(-\tau) = R_X(\tau)$
- (2) $|R_X(\tau)| \leq R_X(0)$
- (3) $R_X(0) = E(X^2(t)) \geq 0$
- (4) $R_X(-\tau) = -R_X(\tau)$
- (5) Question not attempted

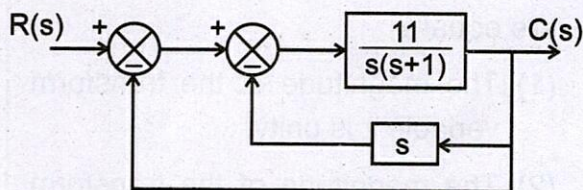
43. What is the probability of an impossible event ?

- (1) 1
- (2) 0
- (3) Not defined
- (4) Insufficient data
- (5) Question not attempted

44. In Bode magnitude plot, the y-axis is typically expressed in :

- (1) Hertz
- (2) Degrees
- (3) Decibels (dB)
- (4) Radians
- (5) Question not attempted

45. The transfer function $\frac{C(s)}{R(s)}$ of the given system is equal to



- (1) $\frac{11}{s^2 + 11s + 11}$
- (2) $\frac{11}{s^2 + s + 11}$
- (3) $\frac{11}{s^2 + 12s + 11}$
- (4) $\frac{11}{s^2 + 10s + 11}$
- (5) Question not attempted

46. In a block diagram, what does a functional block represent ?

- (1) A mathematical operation performed on the input signal
- (2) A physical connection between components
- (3) Input signal
- (4) The summation of multiple signals
- (5) Question not attempted

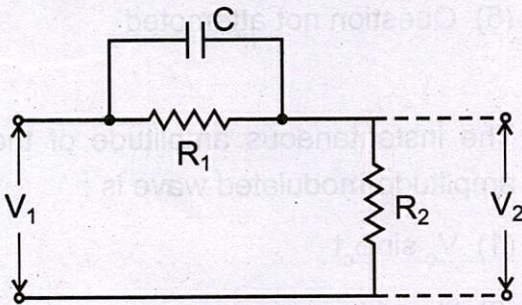
47. For a type-1 system, the steady-state error to a unit step input is :

- (1) Zero
- (2) Finite
- (3) Infinite
- (4) Unity
- (5) Question not attempted

48. Which type of system does not use feedback to control its output ?

- (1) Open-loop system
- (2) Closed-loop system
- (3) Digital system
- (4) Non-linear system
- (5) Question not attempted

49. The circuit shown below is a/an



- (1) lag network
- (2) lead network
- (3) lag-lead network
- (4) amplifier network
- (5) Question not attempted

50. A single input single output linear system is described by the equations $\dot{x} = Ax + Bu$ and $y = Cx + Du$ where A is an $[n \times n]$ matrix and x and B are $[n \times 1]$ vectors. The transfer function is given by

- (1) $C[sI - A]^{-1} B$
- (2) $C[sI - A]B$
- (3) $C[sI - A]^{-1} B + D$
- (4) $C[sI - A]B + D$
- (5) Question not attempted

51. The centroid of asymptotes of the root locus for the given system is

$$G(s)H(s) = \frac{K(s+2)}{s(s+1)(s+4)} \text{ where}$$

$K > 0$

- (1) -2.5
- (2) -1.5
- (3) -2
- (4) -3
- (5) Question not attempted

52. The damping ratio for a critically damped second order system is :

- (1) 0
- (2) 0.5
- (3) 1
- (4) 2
- (5) Question not attempted

53. Signal flow graph represents

- (1) Only time-invariant systems
- (2) Systems with no feedback
- (3) Graphical representation of the relationship between the variables of set of linear algebraic equations
- (4) Only discrete systems
- (5) Question not attempted

54. Lead compensators provide :

- (1) Positive phase shift
- (2) Negative phase shift
- (3) Zero phase shift
- (4) Constant gain only
- (5) Question not attempted

55. The transfer function of linear, time-invariant system is defined as the ratio of Laplace transform of output to Laplace transform of input under :

- (1) Zero initial conditions
- (2) Unit impulse input
- (3) Steady-state conditions
- (4) Non-zero initial conditions
- (5) Question not attempted

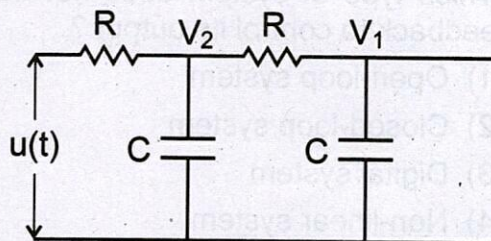
56. In state-space analysis of dynamic systems, which three types of variables are primarily involved in the mathematical modeling ?

- (1) Input variables, output variables and state variables
- (2) State variables, frequency variables and gain variables
- (3) Output variables, stability variables and error variables
- (4) Input variables, error variables and transfer variables
- (5) Question not attempted

57. What is the effect of adding a pole to the open-loop transfer function on the root locus of a control system ?

- (1) The root locus is pulled to the right, reducing relative stability.
- (2) The root locus is pulled to the left, increasing stability.
- (3) The root locus remains unchanged.
- (4) The root locus shifts upward.
- (5) Question not attempted

58. The minimum number of state variable required to describe the network shown in figure is



- (1) 1
- (2) 3
- (3) 4
- (4) 2
- (5) Question not attempted

59. The instantaneous amplitude of the amplitude-modulated wave is :

- (1) $V_c \sin \omega_c t$
- (2) $V_m + V_c$
- (3) $V_c \sin \omega_c t + V_m \sin \omega_m t$
- (4) $V_c (1 + m \sin \omega_m t) \sin \omega_c t$
- (5) Question not attempted

60. Amplitude Modulation (AM) spectrum consists of _____.
- (1) Carrier frequency
 - (2) Upper sideband
 - (3) Lower sideband
 - (4) Carrier frequency with both upper and lower sideband
 - (5) Question not attempted

61. A 20 MHz carrier is frequency modulated by a modulating signal of frequency 1 kHz, if maximum frequency deviation is 100 KHz, then modulation index of F.M. is
- (1) 100
 - (2) 1
 - (3) 50
 - (4) 75
 - (5) Question not attempted

62. Which is not a part of super-heterodyne Amplitude Modulation (AM) receiver ?
- (1) Radio Frequency (RF) section
 - (2) Intermediate Frequency (IF) section
 - (3) Mixer
 - (4) Frequency discriminator
 - (5) Question not attempted

63. Pulse code modulation involves
- (1) PAM followed by quantization
 - (2) Direct encoding using binary words
 - (3) PAM followed by quantization and encoding using binary words
 - (4) PAM followed by encoding using binary words
 - (5) Question not attempted

64. Which of the following statement is not correct regarding binary modulation techniques ?
- (1) ASK can be detected non-coherently.
 - (2) FSK can be detected non-coherently.
 - (3) PSK can be detected non-coherently.
 - (4) FSK can be detected coherently.
 - (5) Question not attempted

65. If in a binary modulation scheme, the modulated signal is expressed as,

$$x_c(t) = \begin{cases} A \cos \omega_1 t & \text{symbol 1} \\ A \cos \omega_2 t & \text{symbol 0} \end{cases}$$

then the modulation technique is

- (1) FSK
- (2) ASK
- (3) DPCM
- (4) PSK
- (5) Question not attempted

66. Which technology allows multiple users to transmit simultaneously on the same frequency band using unique codes ?
- (1) Frequency Division Multiple Access (FDMA)
 - (2) Time Division Multiple Access (TDMA)
 - (3) Code Division Multiple Access (CDMA)
 - (4) Space Division Multiple Access (SDMA)
 - (5) Question not attempted
67. In FDMA,
- (1) Each user is allocated the full spectral occupancy for short duration.
 - (2) Frequency hopping technique
 - (3) Resource allocation by exploiting the spatial separation of the individual user.
 - (4) Disjoint sub-bands of frequencies are allocated.
 - (5) Question not attempted
68. For which purpose, the matched filter is designed for a given transmitted signal ?
- (1) To achieve amplification
 - (2) To increase considerable bandwidth
 - (3) To provide constant output
 - (4) To provide maximum output SNR
 - (5) Question not attempted
69. For a binary source X that generates independent symbols 0 and 1 with equal probability, the source entropy $H(X)$ is
- (1) 1 bit/symbol
 - (2) 2 bit/symbol
 - (3) 4 bit/symbol
 - (4) 8 bit/symbol
 - (5) Question not attempted
70. If a discrete memoryless source has symbols with equal probabilities, what is its entropy ?
- (1) Undefined
 - (2) Maximum
 - (3) Minimum
 - (4) Zero
 - (5) Question not attempted
71. Indicate which one of the following is *not* an advantage of FM over AM.
- (1) Better noise immunity is provided.
 - (2) Lower bandwidth is required.
 - (3) The transmitted power is more useful.
 - (4) Less modulating power is required.
 - (5) Question not attempted
72. Which of the following statement is correct regarding wide-band FM ?
- (1) For which modulation index (β) is small compared to one radian.
 - (2) Widely used in space and satellite communication systems.
 - (3) SNR requirement is very high.
 - (4) Transmitter power requirement is very high.
 - (5) Question not attempted

73. The efficiency, η of ordinary A.M. for $\mu = 0.5$ (50% modulation) is (where μ = modulation index)
- (1) 50% (2) 25%
 - (3) 11.1% (4) 33.3%
 - (5) Question not attempted
74. Cells are often modeled as hexagons to :
- (1) Minimize signal strength
 - (2) Simplify frequency planning
 - (3) Represent the Earth's curvature
 - (4) Minimize antenna size
 - (5) Question not attempted
75. What is CDMA 2000 ?
- (1) 2G digital cellular technology
 - (2) 3G digital cellular technology
 - (3) 3G analog cellular technology
 - (4) GSM technology
 - (5) Question not attempted
76. The main improvement of EDGE over GPRS is :
- (1) Use of DSB-SC
 - (2) Lower power control
 - (3) Higher data rate using new modulation
 - (4) Lower data rate
 - (5) Question not attempted
77. Doppler shift in mobile communications is caused by :
- (1) Signal filtering
 - (2) Antenna switching
 - (3) Relative motion between transmitter and receiver
 - (4) Handoff
 - (5) Question not attempted
78. Multipath fading occur due to :
- (1) Slow transmission
 - (2) Multiple signal reflections
 - (3) Fast fading rate
 - (4) Coherent transmission
 - (5) Question not attempted
79. Which generation introduced digital transmission in cellular systems ?
- (1) 1G (2) 2G
 - (3) 3G (4) 4G
 - (5) Question not attempted
80. Handover refers to :
- (1) Changing user ID between sessions
 - (2) Transferring a call from one cell to another
 - (3) Switching between frequency bands
 - (4) Turning off a mobile device
 - (5) Question not attempted

81. Which IEEE standard defines Bluetooth technology ?

- (1) 802.11
- (2) 802.3
- (3) 802.15.1
- (4) 802.16
- (5) Question not attempted

82. Cell splitting is used to :

- (1) increase cell radius
- (2) improve utilization of spectrum efficiency
- (3) decrease frequency reuse
- (4) decrease spectrum efficiency
- (5) Question not attempted

83. The typical data rate of GPRS is around :

- (1) 9.6 kbps
- (2) 26 kbps
- (3) 120 kbps
- (4) 2 Mbps
- (5) Question not attempted

84. If the cluster size (k) = 27, then what is the frequency reuse ratio ?

- (1) 3.0
- (2) 9.0
- (3) 6.0
- (4) 12.0
- (5) Question not attempted

85. Frequency reuse distance is defined as

- (1) Minimum distance, which allows the same frequency to be reused in co-channel cells.
- (2) Maximum distance, which allows the same frequency to be reused in co-channel cells.
- (3) Radius of a cell
- (4) Average distance which allows the different frequency to be used co-channel cells.
- (5) Question not attempted

86. Which of the following is a second generation cellular standard ?

- (1) IS-95 (2) AMPS
- (3) UMTS (4) ETACS
- (5) Question not attempted

87. The full form of GPRS is

- (1) General Packet Radio Service
- (2) Global Packet Radio Service
- (3) General Phone Radio Service
- (4) General Packet Radio System
- (5) Question not attempted

88. WLAN is based on which IEEE standard ?

- (1) 802.3 (2) 802.11
- (3) 802.5 (4) 802.15
- (5) Question not attempted

89. Snell's law relates :

- (1) The angle of incidence and reflection
- (2) Speed of light and energy
- (3) The refractive indices and angles of incidence/refraction
- (4) Wave and particle nature
- (5) Question not attempted

90. The V-number (normalized frequency) determines :

- (1) Signal bandwidth
- (2) The number of modes a fiber supports
- (3) Length of fiber
- (4) Core diameter only
- (5) Question not attempted

91. In a typical optical receiver, which block comes immediately after the photodetector ?

- (1) Preamplifier (2) Filter
- (3) Equalizer (4) Sampler
- (5) Question not attempted

92. The unit of fiber attenuation coefficient is typically expressed in :

- (1) dB (2) dB/km
- (3) W/m (4) μ W/cm
- (5) Question not attempted

93. The core of an optical fiber is surrounded by :

- (1) Glass tube
- (2) Plastic shield
- (3) Cladding
- (4) Semiconductor layer
- (5) Question not attempted

94. WDM stands for :

- (1) Wide Distribution Management
- (2) Wavelength Division Multiplexing
- (3) Wavelength Displacement Modulation
- (4) Wireless Data Multiplexing
- (5) Question not attempted

95. Plastic optical fibers are mainly used for :

- (1) Long-distance telecommunication
- (2) High-power laser delivery
- (3) Very short-haul and low cost links
- (4) Satellite communication
- (5) Question not attempted

96. Numerical Aperture (NA) of an optical fiber indicates :

- (1) The length of the fiber
- (2) The light collecting ability
- (3) The number of wavelengths transmitted
- (4) The fiber's weight
- (5) Question not attempted

97. An optical coupler is a device that :

- (1) Amplifies optical signals
- (2) Splits optical signals
- (3) Converts optical to electrical signals
- (4) Changes the wavelength of light
- (5) Question not attempted

98. LEDs emit light through which of the following processes ?

- (1) Coherent emission
- (2) Stimulated emission
- (3) Spontaneous emission
- (4) Raman scattering
- (5) Question not attempted

99. INTELSAT stands for

- (1) Indian Telecommunications Satellite
- (2) Inter Telecommunications Satellite
- (3) International Telecommunications Satellite
- (4) International Union for Satellite
- (5) Question not attempted

100. Define the term perigee.

- (1) The point where orbit crosses the equatorial plane.
- (2) The point in the orbit where the satellite is closest to the earth.
- (3) The point in the orbit where the satellite is farthest from the earth.
- (4) The line joining the ascending and descending nodes.
- (5) Question not attempted

101. According to Kepler's first law, the orbit of a satellite is :

- (1) Circular (2) Elliptical
- (3) Parabolic (4) Hyperbolic
- (5) Question not attempted

102. Which of the following is true regarding relationship between solar day and sidereal day ?

- (1) A sidereal day is longer than a solar day.
- (2) A sidereal day is shorter than a solar day.
- (3) A sidereal day is equal in length to a solar day.
- (4) There is no relationship between the two.
- (5) Question not attempted

103. The approximate time taken for a geostationary satellite to complete one revolution is :

- (1) 12 hours (2) 6 hours
- (3) 24 hours (4) 36 hours
- (5) Question not attempted

104. The down link frequency in the C band transponder is

- (1) 6 GHz (2) 14 GHz
- (3) 4 GHz (4) 11 GHz
- (5) Question not attempted

105. Which one of the following is not a satellite sub-system ?

- (1) Attitude and orbit control system
- (2) Power system
- (3) Communication sub-systems
- (4) Medium earth orbit
- (5) Question not attempted

106. Transponders used in 14/11 GHz bands normally employ

- (1) A double frequency conversion scheme.
- (2) Single frequency conversion scheme
- (3) Baseband processing
- (4) Doppler shift
- (5) Question not attempted

107. The main function of the TT&C (Telemetry, Tracking and Command) sub-system is :

- (1) Power generation
- (2) Data transmission to users
- (3) Monitoring and controlling satellite functions
- (4) Signal amplification
- (5) Question not attempted

108. The term GPS stands for :

- (1) Geosynchronous Positioning System
- (2) Global Path System
- (3) Global Positioning System
- (4) Geographical Pointing Satellite
- (5) Question not attempted

109. Which of the following option is NOT correct ? Accelerating or decelerating charges may be found in electrically conducting wires at the positions where the wire is :

- (1) Bent (2) Curved
- (3) Continuous (4) Terminated
- (5) Question not attempted

110. At electrically large distances (i.e., far-field or plane-wave regions), the patterns are proportional to r^n . The value of 'n' is

- (1) -1 (2) -2
- (3) -3 (4) 0
- (5) Question not attempted

111. Which of the following component(s) in the far field for all antennas is zero or vanishingly small compared to other component(s) ?

- (1) E_r (2) E_θ
- (3) E_ϕ (4) E_θ and E_ϕ
- (5) Question not attempted

112. For an antenna, the gain (G) and effective aperture (A_e) are mathematically related by

- (1) $A_e = \frac{\lambda^2}{4\pi} G$
- (2) $A_e = \frac{\lambda^2}{4\pi G}$
- (3) $A_e = \frac{4\pi}{\lambda^2} \cdot G$
- (4) $A_e = \frac{4\pi}{\lambda^2 G}$
- (5) Question not attempted

113. The input impedance of a quarter wavelength monopole antenna is :

- (1) Half of that of the half wavelength dipole antenna
- (2) Equal to that of the half wavelength dipole antenna
- (3) Double to that of the half wavelength dipole antenna
- (4) Double to that of the quarter wavelength dipole antenna
- (5) Question not attempted

114. The length of resonant antenna is in exact multiple of

- (1) $\lambda/2$ (2) λ
- (3) $3\lambda/4$ (4) $5\lambda/8$
- (5) Question not attempted

115. The main disadvantage of microstrip patch antennas is :

- (1) Very high gain
- (2) Narrow bandwidth and low efficiency
- (3) High manufacturing cost
- (4) Complex feed structure
- (5) Question not attempted

116. PIFA stands for :

- (1) Planar Inverted Folded Antenna
- (2) Planar Integrated Frequency Antenna
- (3) Planar Inverted-F Antenna
- (4) Parallel Integrated Folded Antenna
- (5) Question not attempted

117. What is the radiation efficiency of the antenna if the input power is 100 W and the power dissipated in it is 1 W ?

- (1) 100 (2) 1
- (3) 0.99 (4) 0.01
- (5) Question not attempted

118. Radiation intensity of an antenna in given direction :

- (1) Power radiated multiply solid angle
- (2) Power received per unit solid angle
- (3) Power radiated per unit solid angle
- (4) Power absorbed multiply solid angle
- (5) Question not attempted

119. The total radiation pattern of antenna array with identical elements is obtained by :

- (1) Pattern Multiplication
- (2) Difference of all currents
- (3) Sum of all currents
- (4) Reciprocal of distance
- (5) Question not attempted

120. Feeding method using a cable whose inner conductor is attached to the radiation patch while the outer conductor is connected to the ground plane is called :

- (1) Microstrip line feed
- (2) Aperture coupling
- (3) Coaxial feed
- (4) Proximity coupling
- (5) Question not attempted

121. Consider the following statements regarding Smart antenna configurations :

- (A) In a switched-beam antenna, there is a finite number of fixed, predefined patterns or combining strategies.
- (B) In an adaptive array theoretically there are infinite number of patterns that are adjusted in real time.

Choose the correct option from the codes given below :

Codes :

- (1) Only statement (A) is correct.
- (2) Only statement (B) is correct.
- (3) Both statements (A) & (B) are correct.
- (4) Both statements (A) & (B) are incorrect.
- (5) Question not attempted

122. In urban radio propagation, electromagnetic waves experience which of the following propagation mechanism ?

- (1) Only free-space propagation
- (2) Reflection, scattering and diffraction
- (3) Transmission without any distortion
- (4) Absorption by the ionosphere only
- (5) Question not attempted

123. Which equation relates EIRP, gain and transmit power ?

- (1) $EIRP = \text{Gain}/\text{Power}$
- (2) $EIRP = \text{Power} - \text{Gain}$
- (3) $EIRP = \text{Power} \times \text{Gain}$
- (4) $EIRP = \text{Power} \times \text{Wavelength}$
- (5) Question not attempted

124. In an n-type semiconductor, the majority and the minority carriers are respectively

- (1) electron, electron
- (2) electron, hole
- (3) hole, electron
- (4) hole, hole
- (5) Question not attempted

125. In a 555 timer IC, what is the primary role of the series connection of three internal resistors ?

- (1) To stabilize the output voltage
- (2) To protect the flip-flop from overvoltage
- (3) To set reference voltage levels for the internal comparators
- (4) To limit the current through the output stage
- (5) Question not attempted

126. An ideal operational amplifier has the characteristics of an ideal

- (1) very high differential gain, low input impedance and high output impedance
- (2) very low differential gain, low input impedance and high output impedance
- (3) very high differential gain, high input impedance and low output impedance
- (4) very low differential gain, high input impedance and low output impedance
- (5) Question not attempted

127. If a donor type impurity is added to the extent of 1 part in 10^8 , the conductivity of germanium at 30 °C is multiplied by a factor of :

- (1) 10
- (2) 12
- (3) 14
- (4) 16
- (5) Question not attempted

128. In the Hartley oscillator, $L_2 = 0.4$ mH and $C = 0.004$ μ F. If the frequency of the oscillator is 120 kHz, find the value of L_1 . Neglect the mutual inductance.

- (1) 0.08 mH
- (2) 0.04 H
- (3) 0.04 mH
- (4) 0.08 H
- (5) Question not attempted

129. The common collector transistor configuration has the following properties :

- (1) High input and low output impedance
- (2) High input and high output impedance
- (3) Low input and low output impedance
- (4) Low input and high output impedance
- (5) Question not attempted

130. In p-n junction diode, the capacitance developed during reverse-bias region and forward-bias region respectively

- (1) Diffusion capacitance and Transition capacitance
- (2) Storage capacitance and Depletion region capacitance
- (3) Transition capacitance and Diffusion capacitance
- (4) Transition capacitance and Depletion region capacitance
- (5) Question not attempted

131. At pinch-off (JFET), the drain to source current (I_D)

- (1) dropped to zero
- (2) increases sharply
- (3) maintains a saturation level
- (4) flow in reverse direction and increases
- (5) Question not attempted

132. In a n-channel enhancement-type MOSFET

- (1) the substrate is of p-type and the drain and source are n-doped regions linked with n-channel.
- (2) the substrate is of n-type and the drain and source are p-doped regions with a link channel (p-type).
- (3) the substrate is of n-type and the drain and source are p-doped regions with a link n-channel (n type).
- (4) the substrate is of p-type and the drain and source are n-doped regions without a link channel.
- (5) Question not attempted

133. Which one of the following pairs is correctly matched for voltage-shunt feedback ?

- (1) Bandwidth – Decreases
- (2) Non-linear distortion – Increases
- (3) Input resistance – Decreases
- (4) Output resistance – Increases
- (5) Question not attempted

134. For ideal operational amplifier, which one of the following is not correct ?

- (1) Bandwidth = ∞
- (2) Output resistance (R_o) = ∞
- (3) Open circuit (unloaded) voltage gain (A_v) = $-\infty$
- (4) Characteristics do not drift with temperature.
- (5) Question not attempted

135. The Esaki diode is also known as

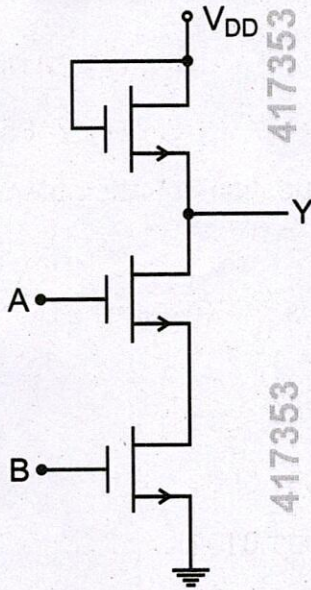
- (1) Zener diode (2) Photo diode
- (3) PIN diode (4) Tunnel diode
- (5) Question not attempted

136. A voltage regulator is used in power supplies to :

- (1) Increase voltage fluctuation
- (2) Provide constant output DC voltage
- (3) Convert AC to DC
- (4) Boost the input voltage
- (5) Question not attempted

137. What condition is required for an SCR to conduct ?
- (1) Application of reverse voltage
 - (2) Gate current applied while anode is positive w.r.t. cathode
 - (3) Removal of gate signal
 - (4) Anode connected to negative terminal
 - (5) Question not attempted
138. The condition for oscillation in a feedback oscillator circuit is that at the frequency of oscillation, initially the loop gain is greater than Unity while the total phase shift around the loop in degree is
- (1) 0
 - (2) 90
 - (3) 180
 - (4) 270
 - (5) Question not attempted
139. The Jump instruction is not associated with the following flag of 8085 microprocessor :
- (1) Carry Flag
 - (2) Parity Flag
 - (3) Auxiliary Carry Flag
 - (4) Sign Flag
 - (5) Question not attempted
140. Which of the following is not a valid flag in 8085 microprocessor ?
- (1) Sign Flag (S)
 - (2) Zero Flag (Z)
 - (3) Parity Flag (P)
 - (4) Counter Flag (C)
 - (5) Question not attempted
141. Which one of the following IC is used for BCD-to-7-segment decoder/driver ?
- (1) 7447
 - (2) 74184
 - (3) 74157
 - (4) 7485
 - (5) Question not attempted
142. What is the result of BCD adder for $7 + 4 = 11$?
- (1) 0001 1001
 - (2) 0001 0001
 - (3) 0001 0101
 - (4) 0001 1000
 - (5) Question not attempted
143. In case of a multiplexer, the minimum number of selection inputs required for selecting one out of 32 inputs is
- (1) 4
 - (2) 5
 - (3) 6
 - (4) 32
 - (5) Question not attempted
144. Simplify the expression $AB + \bar{A}C + BC$.
- (1) $AB + BC$
 - (2) $AB + \bar{A}C$
 - (3) AB
 - (4) $A + B$
 - (5) Question not attempted

145. The output Y of the given n-channel MOS logic circuit is, where A and B are the inputs



- (1) NOR logic (2) NAND logic
(3) Inverter (4) OR logic
(5) Question not attempted

146. Upto how many variables the K-Map technique can be used conveniently beyond which it is very cumbersome ?

- (1) Six variables
(2) Eight variables
(3) Ten variables
(4) Twelve variables
(5) Question not attempted

147. How many cells a K-Map of n variables contains ?

- (1) n (2) 2n
(3) 2^n (4) n^2
(5) Question not attempted

148. Which one of the following Boolean algebra expression is not correct ?

- (1) $A + BC = (A + B)(A + C)$
(2) $A + AB = A$
(3) $(A + B) \cdot (A + \bar{B}) = A + B$
(4) $AB + \bar{A}C + BC = AB + \bar{A}C$
(5) Question not attempted

149. Which of the following is a cause for systematic error in measurement ?

- (1) Wear in instrument components
(2) Parallax error
(3) Electrical noise
(4) Fluctuations in power supply
(5) Question not attempted

150. Which of the following best distinguishes active instruments from passive instruments based on their operation and energy source ?

- (1) Active instruments use only the measured quantity's energy, while passive instruments require an external power source.
(2) Passive instruments can achieve higher measurement resolution than active instruments.
(3) Active instruments use an external power source, with the measured quantity modulating this energy, while passive instruments rely solely on the measured quantity's energy.
(4) Passive instruments are always electrical, while active instruments are always mechanical.
(5) Question not attempted

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