

GATE 2025 ECE Question Paper

Time Allowed :3 hours

Maximum Marks :100

Total questions :65

General Instructions

Read the following instructions very carefully and strictly follow them:

This question paper is divided into three sections:

1. The total duration of the examination is 3 hours. The question paper contains three sections -

Section A: General Aptitude

Section B: Engineering Mathematics

Section C: Subject Based Questions

2. The total number of questions is **65**, carrying a maximum of **100 marks**.

3. The marking scheme is as follows:

- (i) For 1-mark MCQs, $\frac{1}{3}$ mark will be deducted for every incorrect response.
- (ii) For 2-mark MCQs, $\frac{2}{3}$ mark will be deducted for every incorrect response.
- (iii) No negative marking for numerical answer type (NAT) questions.

4. No marks will be awarded for unanswered questions.

5. Follow the instructions provided during the exam for submitting your answers.

(1) Consider three Boolean variables x, y, z . A majority function outputs 1 if the majority of its inputs are 1, otherwise, it outputs 0. Derive the Boolean expression for the majority function and simplify it using Boolean algebra.

- (A) $xy + yz + xz$
 - (B) $x + y + z$
 - (C) $x(y \oplus z) + yz$
 - (D) $(x \oplus y) \oplus z$
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(2) Find the next term in the sequence: 3, 9, 19, 33, _

- (A) 47
 - (B) 49
 - (C) 51
 - (D) 53
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(3) Given the matrix:

$$A = \begin{bmatrix} 2 & 3 & 4 & 5 \\ 0 & 6 & 7 & 8 \\ 0 & 0 & \alpha & \beta \\ 0 & 0 & 0 & \gamma \end{bmatrix}$$

If rank(A) is at least 3, then what are the possible values of α, β, γ ?

- (A) $\alpha \neq 0, \gamma \neq 0, \beta$ is arbitrary
 - (B) $\alpha = 0, \gamma = 0, \beta \neq 0$
 - (C) $\alpha = 0, \gamma = 0, \beta = 0$
 - (D) $\alpha \neq 0, \gamma = 0, \beta = 0$
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(4) What operation is performed by the given circuit?

- (A) B to G Converter
 - (B) Subtractor
 - (C) Multiplier
 - (D) None of the above
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(5) Which of the following best describes the phase and sinusoidal components in the

given control system plot?

- (A) $\sin \omega_c$, θ is ω_p
 - (B) R is ω_p , θ is ω_c
 - (C) θ is ω_c , $\sin$ is ω_p
 - (D) R is ω_c , $\sin \omega_p$
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(6) If a complex function $f(z)$ is analytic everywhere inside a closed contour C with anti-clockwise direction, then which of the following statements are correct?

- (A) $\oint_C \cos z \, dz = 0$
 - (B) $\oint_C \sec z \, dz \neq 0$
 - (C) $\oint_C z^n \, dz = 0$
 - (D) $\oint_C e^z \, dz = 0$
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(7) Two fair dice are rolled, and the random variable X denotes the sum of the outcomes. What is the expected value of X ?

- (A) 6.5
 - (B) 7
 - (C) 7.5
 - (D) 8
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(8) Given that $Z_0 = 50\Omega$, $Z_L = (50 - j75)\Omega$, and $P_i = 10 \text{ mW}$, find the power delivered to the load.

- (A) 5.2 mW
 - (B) 6.4 mW
 - (C) 7.8 mW
 - (D) 8.6 mW
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(9) Given $y(t) = f(\alpha t)$, analyze how Fourier coefficients and time period are affected.

- (A) $C_k = d_k \, \forall k$
- (B) $C_k = \alpha d_k$
- (C) If time period of $f(t)$ is T_0 , then the time period of $f(\alpha t)$ is $\frac{T_0}{\alpha}$

(D) If time period of $f(t)$ is T_0 , then the time period of $f(\alpha t)$ is αT_0

(10) What is the maximum frequency for Clk in MHz, given the flip-flop and logic gate delays?

(A) 100 MHz

(B) 200 MHz

(C) 250 MHz

(D) 500 MHz
