

University of Dhaka
Department of Electrical and Electronic Engineering
Professional Masters in EEE (PMEEE) Admission Test
Session: 2025-2026; Semester: July-December



Total Marks: $20 \times 4 = 80$

Time: 90 Minutes

Answer all of the questions:

1. Draw a full-wave rectifier circuit and explain its operation with input and output waveforms. 4
2. Mention some characteristic features of an ideal Op-amp. 4
3. A binary counter makes a total of 1024 counts, starting from 0. 4
 - a) How many Flip-Flops (FFs) are needed to design this counter?
 - b) The input clock has a frequency of 2 MHz, determine the output frequency of the last FF.
 - c) Find the MOD number of the counter.

4. Use the laws of Boolean Algebra to simplify the following expression and draw the corresponding logic circuit: 4

$$X = (\bar{A} + B)(A + B + D)\bar{D}$$

5. Find the Thévenin equivalent for the circuit shown in the Fig. 1. 4

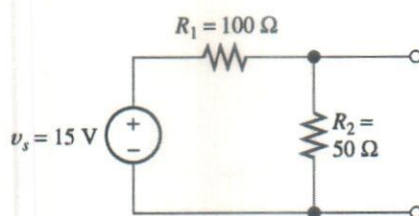


Fig. 1

6. In an AC circuit, the voltage and current are given by $v(t) = 100 \sin(\omega t)$ and $i(t) = 100 \sin\left(\omega t - \frac{\pi}{3}\right)$, respectively. Calculate the power factor of the circuit. 4
7. Consider the circuit in Fig. 2. 4

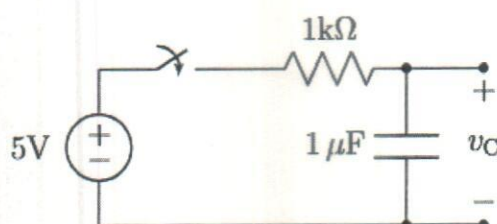


Fig. 2

- a) Find the time constant of this circuit.
- b) Assume the switch is closed, calculate voltage across the capacitor v_C after 1 ms.
8. A series RLC circuit with $L = 160$ mH, $C = 100$ μ F and $R = 40$ Ω is connected to a sinusoidal voltage $v(t) = 40 \sin(\omega t)$, with $\omega = 200$ rad/s. What is the impedance of the circuit? 4
9. Mention different losses of a power transformer. 4
10. Write the difference between circuit breaker and isolator. 4
11. Classify power generation plants based on fuel usage. 4
12. A 10 kW induction motor in a mill runs from 9 am to 3 pm every day. If the unit cost of electricity use is 5.5 taka, what is the utility bill for the motor in the month of June? 4
13. Convert the hexadecimal number $(A3F)_{16}$ to its equivalent binary and decimal representations. 4

14. Name two types of secondary storage devices and mention one advantage of each. 4
15. Perform the binary subtraction $(101101)_2 - (11011)_2$ using two's complement method. 4
16. Describe the functions of control unit of CPU. 4
17. Let $x(t) = 3 \cos(2000\pi t) + 5 \sin(6000\pi t) + 10 \cos(12000\pi t)$ is a continuous-time signal. Determine the frequency (in Hz) associated with each individual term in the signal and find minimum sampling rate required for $x(t)$ to avoid aliasing problem. 4
18. The average power of a signal is 10 mW and that of the noise is 1 μ W. What are the values of signal-to-noise ratio (SNR) and SNR_{dB} ? 4
19. Briefly explain simplex, half-duplex, and full-duplex communication systems with suitable examples of each type. 4
20. Define modulation. Show the waveform of amplitude and frequency modulation. 4