Capital University of Science and Technology
Islamabad

Sample Admission Test for MS Electrical Engineering Degree Program

MATHEMATICS

(1) Compute the limit: $\lim_{\phi \to 0} \dfrac{\cos\phi - 1}{\sin\phi}$

(a) $3/\sqrt{2}$
(b) $\sqrt{2}$
(c) 0
(d) Limit does not exist.

(2) The equation of the line which is perpendicular to the line $3\boldsymbol{x} + \boldsymbol{y} - 6 = 0$ and passes through the point of intersection of the lines $2\boldsymbol{x} - \boldsymbol{y} = 0$ and $3\boldsymbol{x} + 2\boldsymbol{y} = 0$ is:

(a) $3x + 2y - 6 = 0$
(b) $3x + y - 5 = 0$
(c) $x + 3y = 0$
(d) $x - 3y = 0$

(3) The inverse of the matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0.5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ is :

(a) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1/2 & 0 \\ 0 & 0 & 1/3 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1/3 \end{bmatrix}$

(d) does not exist

(4) If $y = x^{x^a}$ then $\dfrac{dy}{dx}$ is:

(a) $y[x^{a-1}(1 + a\ln x)]$
(b) $y[x^{a-1} + a\ln x]$

(c) $y/[x^{a-1} + a\ln x]$

(d) $1/[x^{a-1} + a\ln x]$

(5) $2x^2 + 2y^2 + 2z^2 - 3x + y + 4 = 0$ represents

(a) a plane
(b) a cone
(c) a sphere
(d) an ellipsoid

CIRCUITS and ANALOG ELECTRONICS

(6) If $15\cos(\omega t + \phi)$ volts, where ω is radian frequency and ϕ is phase angle at t = 0, are applied across a capacitor of a capacitance C farad, the impedance of the capacitor is _____ ohm.

(a) $1/j\omega C$

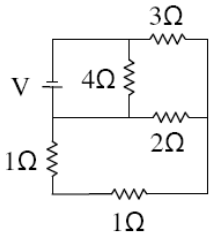
(b) $j\omega C$

(c) $\omega\phi C$

(d) $\phi/j\omega C$

(7) The impedance of a lossless unbounded median is generally _____

(a) imaginary
(b) Real and positive
(c) Real and negative
(d) Complex



ELECTROMAGNETIC THEORY

(8) A magnetic dipole is:

(a) A pair of opposite charges small distant apart
(b) A pair of small current coils small distant apart
(c) A small current coil
(d) A small permanent magnet

(9) In dielectrics when constant electric field is applied the following phenomena occurs:

(a) Current passes through it
(b) Magnetization is induced
(c) Small electric dipoles are induced
(d) Nothing happens

SIGNALS & SYSTEMS, DSP

(10) If $2\delta(t)$ is an impulse function and $3\delta(t-2)$ is a shifted impulse function, then the convolution of the two impulses is _____.

(a) $6\delta(t-2)$
(b) $3\delta(t+3)$
(c) $5\delta(t-2)$
(d) $3\delta(t-5)$

(11) For the system with transfer function $H(z) = \frac{1}{(1-0.5z^{-1})(1-2.5z^{-1})}$ with ROC: $0.5<|z|<2.5$ the system is:

(a) Causal and Stable
(b) Non-causal and Stable
(c) Causal and unstable
(d) Non-causal and unstable

COMMUNICATION SYSTEMS

(12) In Amplitude Modulation, which parameter of the carrier remains constant?
(a) Amplitude
(b) Instantaneous phase
(c) Power
(d) Frequency

(13) Which of the following signals has the largest bandwidth?
(a) Speech
(b) Video
(c) Music
(d) Noise generated by the vibration of a car engine

DIGITAL ELECTRONICS, DESIGN and COMPUTER ARCHITECTURE

(14) The Boolean expression $Y = (\overline{A} + \overline{\mathbf{B}})$ should preferably be implemented by using

(a) a single 2 input NAND gate
(b) a 2 input AND gate and 2 inverters
(c) a 2 input AND and 2 input NAND gate used as inverter
(d) none of these

(15) A microprocessor is called n-bit microprocessor depending on

(a) size of internal data bus
(b) register length
(c) size of external data bus
(d) none of these

CONTROL SYSTEMS

(16) What is the final value of the system represented by transfer function

$$G(s) = \frac{5}{s(s+1)(s+2)(s+3)}$$

(a) 5
(b) 5/2
(c) 5/3
(d) 5/6

(17) A system with more than one input variable or more than one output variable is known by what name?

(a) Robust control system
(b) Closed-loop feedback system
(c) Multivariable control system
(d) Adaptive Control System