**Electrical Engineering Department**

**School of Engineering**



**University of Management and Technology, Lahore**

**PhD Admission Test – Fall 2022**

**Time Duration: 120 Mins**

**Total MCQs: 100**

**Maximum Marks: 100**

**Notes:**

 **1) Attempt All Multiple Choice Questions**

 **2) Only One Option is Correct**

**Marks:**

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Reg. No: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

For Official Use

**Question: 1 – 5**

**Choose from the following, the answer that is opposite in meaning to the main word (Written in Capital letters).**

1. **CONSENSUS**
2. Agreement
3. Disagreement
4. Quality
5. Special case
6. **FECKLESS**
7. Weak
8. Careless
9. Careful
10. Unlucky
11. **EMINENT**
12. Imminent
13. Happy
14. Famous
15. Unknown
16. **PARTISAN**
17. Neutral
18. Popular
19. Biased
20. Stubborn
21. **NEPOTISM**
22. Query
23. Favoritism
24. Impartial
25. Neophyte

**Question: 6 – 8**

**Choose the pair of words that best expresses a relationship similar to that expressed in the pairs of words in capital.**

1. **DETERIORATE : IMPROVE**
2. feckless : careless
3. evanescent : exigent
4. hope : hone
5. obstinate : tractable
6. **AGGRAVATE : ALLEVIATE**
7. later : precede
8. urbane : naïve
9. evasive : wordy
10. feeble : worker
11. **VINDICTIVE : MERCY**
12. transient : fleeting
13. elated : happy
14. crestfallen : cognizant
15. skeptical : trustfulness

**Question: 9 – 15**

**Fill in the blanks with suitable answer from the given options.**

1. In **Lahore**, fares are \_\_\_\_\_\_\_\_\_\_ high.
2. Fascinatedly
3. Extraneously
4. Exorbitantly
5. Passionately
6. As a **result** of the \_\_\_\_\_\_\_\_\_\_, no one can trade with North Korea.
7. Enigma
8. Embargo
9. Vicious
10. Voracious
11. **Most** of the guests arrived \_\_\_\_\_\_\_\_\_ buses.
12. With
13. By
14. From
15. In
16. The man \_\_\_\_\_\_\_\_\_ you met is an aeronautical engineer.
17. Who
18. Whose
19. Whom
20. Which
21. When they were younger, they \_\_\_\_\_\_\_\_\_ ten kilometers a day.
22. Walked
23. Had walked
24. Has been walking
25. Had been walking
26. The number of computer engineers \_\_\_\_\_\_\_\_\_ increasing every year.
27. Is
28. Are
29. Has been
30. Have been
31. The newly installed video game sounds very \_\_\_\_\_\_\_\_\_.
32. Interest
33. Interesting
34. Interested
35. Interestingly
36. If y = 10° in the figure below, what is the value of x in the following figure?



1. 15
2. -20
3. 20
4. 68
5. 47
6. What is the average (arithmetic mean) of all the multiples of ten from 10 to 190 inclusive?
7. 90
8. 95
9. 100
10. 105
11. 110
12. A cubical block of metal weighs 6 pounds. How much will another cube of the same metal weigh if its sides are twice as long?
13. 48
14. 32
15. 24
16. 18
17. 12
18. Square of Iota is
19. 1
20. 2
21. -1
22. -2
23. 0
24. In a class of 78 students 41 are taking French, 22 are taking German. Of the students taking French or German, 9 are taking both courses. How many students are not enrolled in either course?
25. 6
26. 15
27. 24
28. 33
29. 54
30. The straight line $2x+3y+4=0$ touches the x-axis at,
31. $x=-2$
32. $x=2$
33. $x=-1$
34. $x=2$
35. What is the volume of a right-circular cylinder in $cm^{3}$ whose radius is 2 cm, and the height is 14 cm?
36. 176
37. 184
38. 192
39. 200
40. What is sum of the first 10 terms of the sequence: 1, 2, 4, 8, 16, …..?
41. 1017
42. 1020
43. 1023
44. 1026

**Questions 24 – 30**
Nine individuals: Ahmed, Bilal, Danish, Faisal, Haroon, Liaquat, Maryam, Shiza and Zeeshan are to serve on three committees labeled A, B and C.

* Each candidate should serve on exactly one of the committees
* Every committee must have atleast one member
* Committee A should consist of exactly one member more than that of committee B
* Among Maryam, Shiza and Zeeshan none can serve on committee A
* Among Faisal, Harron and Liaquat none can serve on committee B
* Among Ahmed, Bilal and Danish none can serve on committee C
1. In case Danish and Zeeshan are the individuals serving on committee B, how many of the nine individuals should serve on committee C?
	1. 2
	2. 3
	3. 4
	4. 5
	5. 6
2. Of the nine individuals, the maximum number that can serve together on committee C is
3. 5
4. 6
5. 7
6. 8
7. 9
8. In case Ahmed is the only individual serving on committee B, which among the following should serve on committee A?
9. Bilal and Danish
10. Bilal and Faisal
11. Bilal and Liaquat
12. Faisal and Haroon
13. Danish and Haroon
14. In case, any of the nine individuals serves on committee C, which among the following could not be the candidate to serve on committee A?
15. Ahmed
16. Bilal
17. Danish
18. Liaquat
19. Shiza
20. In case, Bilal, Danish and Maryam are the only individuals serving on committee B, the total membership of committee C should be,
21. 5
22. 4
23. 3
24. 2
25. 1
26. In case, Bilal, Danish and Maryam are the only individuals serving on committee B, then the members of committee C should be,
27. Haroon and Shiza
28. Maryam and Zeeshan
29. Shiza and Zeeshan
30. Faisal and Shiza
31. Haroon and Maryam
32. Among the following combinations which could constitute the membership of committee C?
33. Danish and Shiza
34. Faisal and Maryam
35. Liaquat, Maryam and Shiza
36. Faisal, Haroon and Liaquat
37. Ahmed, Faisal, Maryam and Zeeshan
38. Eddy current loss will depend on,
39. Frequency
40. Flux density
41. Core thickness
42. All of the above
43. The emf induced in the dc generator armature winding is
44. AC
45. DC
46. AC and DC
47. None of the above
48. The rating of generator is represented by,
49. kVA
50. kW
51. kVAR
52. None of the above
53. The speed of a 4-pole, 50 Hz synchronous machine will be,
54. 1500 rpm
55. 1800 rpm
56. 3000 rpm
57. 3600 rpm
58. Slip exists in
59. Induction motor
60. Synchronous motor
61. Vernier motor
62. All of the above
63. What is Control System?
64. Control system is a system in which the output is controlled by varying the input.
65. Control system is a device that will not manage or regulate the behavior of other devices using control loops.
66. Control system is a feedback system that can be both positive and negative.
67. Control System is a system in which the input is controlled by varying the output.
68. Which of the following element is not used in an automatic control system?
69. Final control element
70. Sensor
71. Oscillator
72. Error detector
73. In a temperature control system, what conversion in signal takes place?
74. Error to Digital
75. Error to Analog
76. Digital to Analog
77. Analog to Digital
78. What is the relation between output response and input signal in closed loop system?
79. Nonlinear
80. Linear
81. Exponential
82. Parabolic
83. Sampling is necessary \_\_\_\_\_\_\_\_\_\_\_\_
84. Non automated control system
85. In Automated control system
86. In complex control system
87. Where high accuracy is required
88. Root locus is used to calculate:
89. Marginal stability
90. Absolute stability
91. Conditional stability
92. Relative stability
93. A bandpass sampling extends from 4-6 kHz. What is the smallest sampling frequency required to retain all the information in the signal?
94. 1 kHz
95. 2 kHz
96. 3 kHz
97. 4 kHz
98. Energy per unit charge is \_\_\_\_\_\_\_\_\_\_\_\_
99. Power
100. Voltage
101. Current
102. Capacitance
103. A 25 Ω resistor has a voltage of 150 sin377 t. Find the corresponding power.
104. 900 sin2 337 t
105. 90 sin2 337 t
106. 900 sin2 377 t
107. 9 sin2 337 t
108. The dependent sources are of \_\_\_\_\_\_\_\_\_\_\_\_\_ kinds.
109. 5
110. 2
111. 3
112. 4
113. Which of the following is not an example of a linear element?
114. Resistor
115. Thermistor
116. Inductor
117. Capacitor
118. The voltage across R1 resistor in the circuit shown below is?

119. 10
120. 5
121. 2.5
122. 1.25
123. If the resistances 1Ω, 2Ω, 3Ω, 4Ω are parallel, then the equivalent resistance is?
124. 0.46Ω
125. 0.48Ω
126. 0.5Ω
127. 0.52Ω
128. Consider a circuit with two unequal resistances in parallel, then \_\_\_\_\_\_\_\_\_\_\_
129. Large current flows in large resistor
130. Current is same in both
131. Potential difference across each is same
132. Smaller resistance has smaller conductance
133. Determine the current in all resistors in the circuit shown below.
134. 2A, 4A, 11A
135. 5A, 4.8A, 9.6A
136. 9.3A, 20.22A, 11A
137. 10.56A, 24.65A, 14.79A
138. A mesh is a loop which contains \_\_\_\_ number of loops within it.
139. 1
140. 2
141. 3
142. no loop
143. In the figure shown below, the current through loop 1 be I1 and through the loop 2 be I2, then the current flowing through the resistor R3 will be?



1. I1
2. I2
3. I1-I2
4. I1+I2
5. If source impedance is complex, then maximum power transfer occurs when the load impedance is \_\_\_\_\_\_\_ the source impedance.
6. equal to
7. negative of
8. complex conjugate of
9. negative of complex conjugate of
10. The convolution y [n] = x [n] \* h [n], where x [n] = {1,2,4} and h [n] = {1,1,1,1,1} is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. {1,3,7,7,7,6,4}
12. {1,3,3,7,7,6,4}
13. {1,2,4}
14. {1,3,7}
15. A signal is a power signal if the signal has average power equal to \_\_\_\_\_\_\_\_\_\_
16. Infinite
17. Finite
18. Zero
19. Does not depend on the average power value
20. Find the Fourier transform of $e^{jω\_{0}t}.$
21. $δ\left(ω + ω0\right)$
22. $2πδ(ω + ω0)$
23. $δ(ω – ω0)$
24. $2πδ(ω – ω0)$
25. The filter which passes all frequencies above fc by attenuating significantly, all frequencies below fc is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
26. Low-pass
27. High-pass
28. Band-pass
29. Band-stop
30. Find the Laplace transform of $δ(t).$
31. 1
32. 0
33. $\infty $
34. 2
35. Which of the following energy source gives the best conversion efficiency?
36. Wind
37. Solar
38. Hydro
39. All of the above
40. Which of the following is the most popular wind turbine?
41. Vertical axis
42. Horizontal axis
43. Hybrid
44. None of the above
45. A photovoltaic cell produces
46. Current
47. Voltage
48. Power
49. All of the above
50. Which transmission system has a high efficiency at long distance?
51. High voltage AC
52. High voltage DC
53. Both AC and DC
54. None of the above
55. Aluminum has replaced copper as the most common conductor metal for overhead transmission due to,
56. Low cost
57. High efficiency
58. High temperature stability
59. All of the above
60. “The tendency of alternating high-frequency currents to crowd toward the surface of a conducting material” is called
61. Skin effect
62. Earth effect
63. Transmission effect
64. None of the above
65. The admittance of the impedance $-j\frac{1}{2}Ω$ is given by
66. – j2 S
67. j2 S
68. – j4 S
69. None of the above
70. Which of the following is a renewable energy source?
71. Hydro energy
72. Solar thermal
73. Tidal energy
74. All of the above
75. Which light source gives high efficiency
76. Incandescent bulb
77. Fluorescent lamp
78. LED
79. All of the above
80. An over-current relay has a single input in the form of
81. DC current
82. AC current
83. AC voltage
84. None of the above
85. The power dissipation of CMOS logic gate depends on what?
86. The drain-source current
87. Switching frequency and transistor width
88. The gate-source capacitance
89. The supply voltage and switching frequency
90. Which type of measurement is using eye-diagram analyasis?
91. Power
92. Propagation delay
93. Speed
94. Slew
95. What is the most significant specification of a power MOSFET?
96. Power dissipation
97. Switching speed
98. Drain-current
99. ON-resistance
100. What is the implication of parasitic capacitance and resistance of a CMOS transistor?
101. Increased power dissipation
102. Reduced speed
103. Increased leakage current
104. Reduced bandwidth
105. What is the significance of schottky diode?
106. High power dissipation
107. High forward voltage drop
108. Fast recovery time
109. Low leakage current
110. What is the advantage of bipolar junction transistor over CMOS transistor
111. Low power dissipation
112. High bandwidth
113. Low collector-emitter voltage drop
114. High driving capability
115. How a voltmeter with low sensitivity (kΩ/V) will effect circuit-under-test?
116. High loading effect
117. Low accuracy
118. Low loading effect
119. No effect
120. The MEMS sensors are primarily used for what?
121. Displacement measurement
122. Touch measurement
123. Temperature measurement
124. Angular measurement
125. Which type of pressure sensor is used to measure varying pressures?
126. Capacitive sensor
127. Inductive sensor
128. Piezoelectric sensor
129. Strain gauge sensor
130. It is best to operate a silicon diode used as a temperature at:
131. High forward current
132. Decreased sensitivity (mV/°K)
133. Low forward current
134. Low biasing voltage
135. A device that converts 2N input lines into N output lines is called
136. Converter
137. Decoder
138. CPU
139. Encoder
140. The hexadecimal number B6C7 is equivalent to decimal number
141. 49761
142. 46791
143. 47691
144. 41769
145. A combination of AND function and NOT function results in
146. AND gate
147. NAND gate
148. NOR gate
149. XOR gate
150. \_\_\_\_\_\_\_\_\_ are the alternative form of canonical form
151. Sum of minterm
152. Product of Maxterm
153. Standard form
154. Both A and B
155. The fan-out of TTL logic family is \_\_\_\_\_\_\_\_\_\_
156. 2
157. 5
158. 8
159. 10
160. An 8 bit microprocessor has 16 bit address bus **A0-A15.** The processor addresses a 1-K byte memory chip. The address range for the chip is
161. FOOFH to F40EH
162. F000H to F3FFH
163. F100H to F4FFH
164. F700H to FAFFH
165. How many addressing modes are present in 8086?
166. 6
167. 4
168. 2
169. 8

1. Coulomb law is employed in
2. Electrostatics
3. Magnetostatics
4. Electromagnetics
5. Maxwell theory
6. The Coulomb law is an implication of which law?
7. Ampere law
8. Gauss law
9. Biot Savart law
10. Lenz law
11. Find the Maxwell equation derived from Faraday’s law.
12. Div(H) = J
13. Div(D) = I
14. Curl(E) = -dB/dt
15. Curl(B) = -dH/dt
16. Find the Maxwell law derived from Ampere law.
17. Div(I) = H
18. Div(H) = J
19. Curl(H) = J
20. Curl(B) = D
21. Diameter of antenna is doubled. The maximum range will \_\_\_\_\_\_\_\_
22. Be doubled
23. Be halved
24. Become four times
25. Decrease to one fourth
26. In amplitude modulation frequency and phase of carrier \_\_\_\_\_\_\_\_
27. Varies simultaneously
28. Varies alternately
29. Initially varies but become same after sometime
30. Remains constant
31. When aliasing takes place?
32. Sampling signals less than Nyquist Rate
33. Sampling signals more than Nyquist Rate
34. Sampling signals equal to Nyquist Rate
35. Sampling signals at a rate which is twice of Nyquist Rate
36. Envelope Detector is a/an \_\_\_\_\_\_\_\_
37. Coherent detector
38. Asynchronous Detector
39. Synchronous Detector
40. Product Demodulator
41. Mixing is used in communication to \_\_\_\_\_\_\_\_
42. Raise the carrier frequency
43. Lower the carrier frequency
44. To altered the deviation
45. To change the carrier frequency to any required value
46. Skin effect refers \_\_\_\_\_\_\_\_
47. The increase of wire resistance with frequency
48. The decrease of wire resistance with frequency
49. The uniform nature of wire resistance with frequency
50. The way radio signals travel across a flat surface
51. What is speed of radio waves in free space?
52. 3 x 106 m/s
53. 3 x 109 m/s
54. 300 x 106 m/s
55. 300 x 109 m/s
56. Consider the differential equation *y″* + 16*y* = 0. Which of the following functions is not a solution on the entire real line?
57. *y*1(*t*) = cos 4*t*
58. *y*2(*t*) = sin 4*t*
59. *y*3(*t*) = *c*1 cos 4*t* + *c*2 sin 4*t*
60. *y*4(*t*) = *e*4*t*

1. Which of the following functions is a solution of the initial value problem *y′* + 2*y* =

*e−*2*t*, *y*(0) = 0?

1. *y*(*t*) = *te−*2*t*
2. *y*(*t*) = *−te−*2*t*
3. *y*(*t*) = *te*2*t*
4. *y*(*t*) = *t*2*e−*2*t*
5. If *q*(*t*) represents the charge at a cross-section in a circuit at time *t*, then the current *I*(*t*) is given by:
6. *I*(*t*) = *q*(*t*)
7. *I*(*t*) = *q′*(*t*)
8. *I*(*t*) = *q′′* (*t*)
9. *I*(*t*) = *q*2(*t*)
10. Consider the linear first order differential equation given by *u′* = *−*2*tu*. Which of the following functions is a solution of this differential equation:
11. *u*(*t*) = *e−t*
12. *u*(*t*) = *e−*2*t*
13. *u*(*t*) = *e−t*2
14. *u*(*t*) = $e^{t^{2}}$