

Nepal Engineering Council Registration Examination
Model Question for Information Technology (AI&E)

Section A (60*1 = 60)

1. Decibel relation for power gain is:
 - a) $N_{dB} = 20 \log_{10} \left(\frac{V_2^2}{V_1^2} \right) + 20 \log_{10} \left(\frac{Z_1}{Z_2} \right)$
 - b) $N_{dB} = 10 \log_{10} \left(\frac{V_2^2}{V_1^2} \right) + 10 \log_{10} \left(\frac{Z_1}{Z_2} \right)$
 - c) $N_{dB} = 20 \log_{10} \left(\frac{V_2}{V_1} \right) + 10 \log_{10} \left(\frac{Z_2}{Z_1} \right)$
 - d) $N_{dB} = 10 \log_{10} \left(\frac{V_2}{V_1} \right) + 10 \log_{10} \left(\frac{Z_2}{Z_1} \right)$
2. Maximum power that can be transfer from source to load is:
 - a) 25%
 - b) 75%
 - c) 50%
 - d) 100%
3. Power factor $\frac{R}{Z}$ has maximum value of:
 - a) 0.0
 - b) 0.5
 - c) 1.0
 - d) 1.5
4. EEPROM has drain and floating gate gap of
 - a) 5 nm
 - b) 10 nm
 - c) 12 nm
 - d) 15 nm
5. Heisenberg principle of uncertainty says:
 - a) Signal of 10Hz can be generated.
 - b) Signal of 10MHz can be generated.
 - c) Signal of 100MHz can be generated.
 - d) Signal of band 100MHz-105MHz can be generated
6. UHF frequency signal can be amplified using:
 - a) Class A amplifier
 - b) Class AB amplifier
 - c) Class C amplifier
 - d) Class B amplifier
7. Two's complement of 00011011 is:
 - a) 11100100
 - b) 11100101
 - c) 11000101
 - d) 11110001

8. Elementary building block of combinational circuit is:
 - a) Logic gate
 - b) Flip-flop
 - c) Both logic gate and flip-flop
 - d) Memory
9. Synchronous circuit that changes its state at specific clock signal is:
 - a) Event driven
 - b) Clock driven
 - c) Pulse driven
 - d) Frequency driven
10. Bandwidth of microprocessor represents:
 - a) Clock speed
 - b) Width of internal bus
 - c) Number of bit processed/instruction
 - d) Number of bit processed/sec
11. PPI 8255 has internal bus of size:
 - a) 4 bit
 - b) 8 bit
 - c) 16 bit
 - d) 32 bit
12. Interrupt Service Route (ISR) executes
 - a) Before execution of current instructions
 - b) With pause of current instructions
 - c) After execution of current instructions
 - d) With execution of no instruction
13. What is the purpose of the "printf ()" function in C programming?
 - a) To print output to the console
 - b) To read input from the console
 - c) To perform arithmetic operations
 - d) To declare variables
14. What is the purpose of the "rewind ()" function in C programming?
 - a) To move the file pointer to the end of the file
 - b) To move the file pointer to the beginning of the file
 - c) To read data from a file
 - d) To write data to a file
15. Which of the following access specifiers in C++ allows access to class members only within the class?
 - a) Public
 - b) Private
 - c) Protected
 - d) Friend

16. What is the purpose of a constructor in C++?
 - a) To create data members of a class
 - b) To overload operators in a class
 - c) To initialize data members of a class
 - d) To free memory used by an object
17. Which of the following is true about pure virtual functions in C++?
 - a) They have a function body
 - b) They can be called directly
 - c) They can only be declared in the derived class
 - d) They can only be declared in the base class
18. What is the purpose of the try block in C++ exception handling?
 - a) To catch exceptions that are thrown by the program
 - b) To declare the variables that are used in the catch block
 - c) To handle errors that are caught by the program
 - d) To define the exceptions that are thrown by the program
19. Which of the following is not an addressing mode?
 - a) Direct addressing mode
 - b) Indirect addressing mode
 - c) Inverted addressing mode
 - d) Indexed addressing mode
20. Which of the following is a fundamental principle of cache memory design?
 - a) Increasing the cache size always improves performance
 - b) A direct mapping function is always better than an associative mapping function
 - c) The least recently used replacement algorithm is always the best choice
 - d) The cache should store frequently used data to reduce memory access time
21. Which of the following is not a characteristic of multiprocessors? → it should be related to 4.3
 - a) Enhanced reliability
 - b) Reduced complexity
 - c) Sharing of resources
 - d) Increased throughput
22. What is an application-specific instruction-set processor (ASIP)?
 - a) A processor that is optimized for a specific application
 - b) A processor that can run any application
 - c) A processor that is designed for general-purpose computing
 - d) A processor that can be programmed by the user
23. What is the purpose of a watchdog timer in an RTOS?
 - a) To control the execution of tasks
 - b) To synchronize I/O operations

- c) To monitor the system and detect faults
 - d) To schedule tasks based on their priority
24. What does VHDL stand for?
- a) Very High Definition Logic
 - b) Very High-level Design Language
 - c) Virtual Hardware Description Language
 - d) Vector High-level Design Logic
25. Which networking device operates at the data link layer of the OSI model and filters traffic based on MAC addresses?
- a) Hub
 - b) Router
 - c) Switch
 - d) Bridge
26. Which error detection and correction technique involves adding redundant bits to the data being transmitted?
- a) Parity check
 - b) Checksum
 - c) Hamming code
 - d) CRC
27. Which routing algorithm is used by the Open Shortest Path First (OSPF) protocol?
- a) Distance vector
 - b) Link state
 - c) Path vector
 - d) Hierarchical
28. Which protocol at the transport layer provides reliable, connection-oriented data transfer?
- a) UDP
 - b) FTP
 - c) TCP
 - d) ICMP
29. Which protocol is used for email transfer?
- a) HTTP
 - b) FTP
 - c) SNMP
 - d) SMTP
30. Which type of network security device is used to monitor and filter incoming and outgoing network traffic?
- a) Antivirus software
 - b) Intrusion detection system (IDS)

- c) Firewall
 - d) Virtual private network (VPN)
31. What is the value of tangential component of electric field in a dielectric-conductor boundary (interface)?
 - a) Zero
 - b) Infinite
 - c) One
 - d) Three
 32. Which of the following statements are true regarding Bio-Savart's Law?
 - a) Magnetic field directly proportional to Cross sectional area of conductor.
 - b) Bio-Savart's Law deals with Electric field.
 - c) Magnetic field directly proportional to Current through the conductor.
 - d) Electric field directly proportional to Current through the conductor.
 33. For a plane wave Propagation in an unbound medium (free Space) the minimum angle between electric field and magnetic field vector is
 - a) 0°
 - b) 30°
 - c) 90°
 - d) 180°
 34. What is the radiation pattern of an isotropic radiator?
 - a) Doughnut
 - b) Sphere
 - c) Hemisphere
 - d) Circular
 35. Which of the following is not true with respect to antenna?
 - a) Lower Frequencies are radiated near the end of transmission line.
 - b) Horn antennas are used to feed parabolic disk Antenna.
 - c) Yagi-Uda antennas have high bandwidth and low gain.
 - d) Higher frequencies are radiated near the feed point.
 36. The path loss in free space propagation is proportional to

[Option]

 - a) Square of distance
 - b) Inverse of the distance
 - c) Logarithm of the distance
 - d) Proportional to the distance
 37. level is where the model becomes compatible and executable code
 - a) Abstract level
 - b) Application level
 - c) Implementation level
 - d) All of the above

38. What is the hash function used in the division method?
- a) $h(k) = k/m$
 - b) $h(k) = k \bmod m$
 - c) $h(k) = m/k$
 - d) $h(k) = m \bmod k$
39. Redundancy is reduced in a database table by using the ----- form.
- a) Abnormal
 - b) Normal
 - c) Special
 - d) Exactly
40. It is advisable, to store the ----- before applying the actual transaction to the database.
- a) Data
 - b) Logs
 - c) Receive
 - d) Record
41. To enforce two functions are provided enter-critical and exit-critical, where each function takes as an argument the name of the resource that is the subject of competition.
- a) Mutual Exclusion
 - b) Synchronization
 - c) Deadlock
 - d) Starvation
42. If you wanted to require that a user enter an Administrator password to perform administrative tasks, what type of user account should you create for the user?
- a) Administrator User account
 - b) Standard User account
 - c) Power User account
 - d) Authenticated User account
43. The process to gather the software requirements from client, analyze and document them is known as _____.
- a) Feasibility Study
 - b) Requirement Gathering
 - c) Requirement Engineering
 - d) System Requirements Specification
44. What is reference architecture?
- a) It is a reference model mapped onto software components
 - b) It provided data flow with comments
 - c) It provides data flow with pieces
 - d) It is a reference model mapped onto software components & data flow with comments

45. Which access specifier is used to make the members of a class accessible only within the same class?
- a) public
 - b) private
 - c) protected
 - d) public and protected
46. What is operator overloading in C++?
- a) Defining a new operator.
 - b) Overriding an existing operator.
 - c) Changing the behaviour of an existing operator.
 - d) Changing the behaviour of new operator.
47. What is the difference between ifstream and ofstream in C++?
- a) ifstream is used for input, while ofstream is used for output.
 - b) ofstream is used for input, while ifstream is used for output.
 - c) both are used as input.
 - d) both are used as output
48. What is a class template in C++?
- a) A class that can be used to create objects of different types.
 - b) A function that can be used to create objects of different types.
 - c) A variable that can be used to create objects of different types.
 - d) A character that can be used to create objects of different types.
49. Which of the following is not a medium of transmission?
- a) Microwave system
 - b) Wire
 - c) Free space
 - d) Fiber optic cable
50. Actual radio coverage of a cell is called _____
- a) Fingerprint
 - b) Footprint
 - c) Imprint
 - d) Matrix
51. Rake Receiver does....
- a) Forward Error Correction
 - b) Backward Error Correction
 - c) Resembles equalizer
 - d) Resembles equalizer and Counter effects multipath fading
52. The bit rate of personal communication is _____
- a) 300 to 9600 bits/sec
 - b) 300 to 3400 bits/sec
 - c) 400 to 9600 bits/sec
 - d) 400 to 3500 bits/sec

53. The ATM is an example for _____ circuit network.
- a) Datagram subnet
 - b) Virtual circuit subnet
 - c) Packet subnet
 - d) Volume subnet
54. Which agency sets the standards for telecommunications internationally?
- a) International Telecommunication Union (ITU)
 - b) International Centre for Telecommunication Science (ICTS)
 - c) International Telecommunication Protocol (ITP)
 - d) Integrated Telecommunication of the United Nations (ITUN)
55. Standard dimensions (mm x mm) of A3 drawing sheet is
- a) 11.69×16.54
 - b) 29.7×42
 - c) 297×420
 - d) 420×280
56. Which of the following methods of charging depreciation of an asset has increased amount of depreciation as the age of asset increases
- a) sum-of-year digit
 - b) sinking fund
 - c) diminishing balance
 - d) straight line
57. The process of optimizing the project's limited resources without extending the project duration is known as
- a) project crashing
 - b) resource levelling
 - c) resource smoothing
 - d) networking
58. The process of composing/raising the required fund from different sources such as equity, preferred stock, bond and debenture is known as
- a) capital structure planning
 - b) project financing
 - c) capital budgeting decision
 - d) deducing earning per share
59. In which of the following society, people used to seek their existence on growing plants for their cattle and domestic animals
- a) pastoral society
 - b) tribal society
 - c) horticultural society

- d) agricultural society
60. According to Nepal Engineering Council Act, 2055 (Revised, 2079), all engineering academic institutions shall be in the Council.
- a) affiliated
 - b) united
 - c) recognized
 - d) associated

Section-B (20*2 = 40)

61. A 10 μH inductor, $\frac{40}{\pi^2}$ pF capacitor and a 628 Ω resistor are connected to form a series RLC circuit. Calculate Q-factor of this circuit at resonant frequency.
- a) 1.0142×10^{-6}
 - b) 2.50
 - c) 1.0142×10^{-9}
 - d) 2.50×10^{-3}
62. A 400 mH coil of negligible resistance is connected to an AC circuit in which an effective current of 6 mA is flowing. Find out the voltage across the coil if the frequency is 1000 Hz.
- a) 15.07V
 - b) 15079.67 V
 - c) 150.79 V
 - d) 15079 V
63. Convert $(312)_8$ into decimal:
- a) $(200)_{10}$
 - b) $(202)_{10}$
 - c) $(204)_{10}$
 - d) $(206)_{10}$
64. A microcontroller is running a program with a clock frequency of 8 MHz. The microcontroller receives an interrupt request from an external device that requires 20 cycles to service. What is the time required to service the interrupt?
- a) 2.5 μs
 - b) 20 ns
 - c) 40 ns
 - d) 160 ns
65. What is the output of the following code snippet?
- ```
int x = 7;
int y = 11;
Printf ("%d", ++x%y);
```
- a) 7

- b) 9
  - c) 8
  - d) 4
66. Which of the following correctly defines a default argument in a function in C++?
- a) void function (int x = 0, int y);
  - b) void function (int x, int y = 0, in z);
  - c) void function (int x = 0, int y, int z);
  - d) void function (int x, int y=0, int z = 0);
67. Which of the following is a mode of transfer in I/O operations that enables the CPU to perform other tasks while the data transfer is taking place?
- a) Programmed I/O
  - b) Interrupt-driven I/O
  - c) Direct memory access (DMA)
  - d) Memory-mapped I/O
68. What is the main difference between a real-time operating system (RTOS) and a general-purpose operating system (GPOS)?
- a) RTOS is designed for time-critical applications, while GPOS is not
  - b) RTOS is more complex than GPOS
  - c) RTOS has more features than GPOS
  - d) RTOS can run on any type of hardware, while GPOS is designed for specific hardware configurations
69. What is the purpose of Address Resolution Protocol (ARP)?
- a) To convert IP addresses to MAC addresses
  - b) To convert MAC addresses to IP addresses
  - c) To route packets between networks
  - d) To detect and correct errors in data transmission
70. Which network layer protocol is used to fragment and reassemble packets that are too large to be transmitted over the network?
- a) IP
  - b) ARP
  - c) ICMP
  - d) TCP
71. Five Equal Capacitors are connected in series have a resultant capacitance of 4 $\mu$ F. When these are Put in parallel and Charged to 400 V, the total Energy stored is:
- a) 16 J
  - b) 8 J
  - c) 4 J
  - d) 2 J

72. A 100  $\mu\text{F}$  Capacitor rated for 400 V, 50 Hz has  $\tan\delta = 0.01$ . What will be the rated dielectric loss?
- 100.5 W
  - 50.2 W
  - 10 W
  - 222 W

73. What does the following function do for a given Linked List with first node as head?

```
void fun1(struct node* head)
{
 if (head == NULL)
 return;
 fun1(head->next);
 printf("%d ", head->data);
}
```

- Prints all nodes of linked lists
- Prints all nodes of linked list in reverse order
- Prints alternate nodes of Linked List
- Prints alternate nodes in reverse order

74. Consider the following three processes in the FCFS. What is the average waiting time?

| Process ID. | Brust-time | Arrival-time |
|-------------|------------|--------------|
| P1          | 3          | 3            |
| P2          | 6          | 6            |
| P3          | 9          | 9            |

- 2
- 3
- 4
- 5

75. What kind of support is provided by the Code Generation CASE tool?

- Cross referencing queries and requirements tracing
- Transformation of design records into application software
- Compiling, interpreting or applying interactive debugging code
- Transformation of design records into application software AND Compiling, interpreting or applying interactive debugging code

76. What is the output of the following C code?

```
int x = 10, y = 20;
int *p = &x, *q = &y;
*p = *q;
*q = 30;
```

- $x = 10, y = 20$
- $x = 20, y = 30$
- $x = 30, y = 20$

d)  $x = 30, y = 30$

77. A spectrum of 30 MHz is allocated to a cellular system, which uses two 25 KHz simplex channels to provide full duplex voice channels. What is the number of channels available per cell for 4-cell reuse factor?
- a) 150 channels
  - b) 600 channels
  - c) 50 channels
  - d) 85 channels
78. A rate  $\frac{1}{2}$  convolution code with  $d_{\text{ref}} = 10$  is used to encode a data resequencing occurring at a rate of 1 Kbps. The modulation is binary PSK. The DS spread spectrum sequence has a chip rate of 10 MHz. The coding gain is .....
- a) 9 dB
  - b) 7 dB
  - c) 12 dB
  - d) 24 dB
79. Effective monthly interest rate will be ....., if nominal interest rate of 10% accounted for continuous compounding
- a) 1%
  - b) 0.84%
  - c) 1.2%
  - d) 2%
80. By considering following activities of a project, the project duration will be

| Activity               | A | B | C | D | E       |
|------------------------|---|---|---|---|---------|
| Immediate predecessors | - | - | - | C | A, B, D |
| Duration (days)        | 4 | 5 | 3 | 7 | 5       |

- a) 9 days
- b) 10 days
- c) 15 days
- d) 24 days