Nepal Engineering Council Registration Examination
Model Question for Information Technology (AItE)

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) Yogi-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 mod m
    c) h(k) = m/k
    d) h(k) = m mod 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 4µF. 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 µF Capacitor rated for 400 V, 50 Hz has tanδ = 0.01. What will be the rated dielectric loss?
a)100.5 W
b) 50.2 W
c) 10 W
d) 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);
}
```

a) Prints all nodes of linked lists
b) Prints all nodes of linked list in reverse order
c) Prints alternate nodes of Linked List
d) 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

a) 2
b) 3
c) 4
d) 5

75. What kind of support is provided by the Code Generation CASE tool?
a) Cross referencing queries and requirements tracing
b) Transformation of design records into application software
c) Compiling, interpreting or applying interactive debugging code
d) 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;
```

a) x = 10, y = 20
b) x = 20, y = 30
c) 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 ½ convolution code with dfref = 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