Nepal Engineering Council Registration Examination
Model Question for Computer Engineering (ACtE)

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. Which of the following is not a data type in C?
    a) int
    b) float
    c) String
    d) char

14. What is the size of a pointer in C?
    a) 1 byte
    b) 2 bytes
    c) 4 bytes
    d) It depends on the system architecture

15. 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

16. 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.

17. 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

18. 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.

19. What is the purpose of the control unit in a CPU?
    a) To perform arithmetic and logical operations on data.
    b) To store and retrieve data from memory.
    c) To interpret instructions and control the flow of data within the CPU.
    d) To print data from memory

20. What is the purpose of the cache replacement policy?
    a) To determine which data to store in the cache.
    b) To determine which data to evict from the cache when space is needed.
    c) To determine how many levels of cache to use.
    d) To determined which data to store in RAM.

21. Which of the following is not a type of DMA transfer mode?
    a) Burst mode
    b) Cycle-stealing mode
    c) Interrupt mode
    d) Instruction mode.

22. An instruction set refers to a set of ----------
    a) rules for writing code in a specific programming language.
    b) instructions that a processor can execute.
    c) input/output operations that a processor can perform.
    d) printing command

23. What is a real-time kernel?
    a) The core component of a real-time operating system.
    b) The user interface of a real-time operating system.
    c) The hardware component of a real-time operating system.
    d) The core component of a real-time pointer system.

24. What is a signal in VHDL?

a) A variable used to store a value in a digital circuit.
b) A physical wire used to transmit data in a digital circuit.
c) A function used to perform a specific task in VHDL.
d) A file used to store a specific task.

25. Which of the following is an example of a physical layer protocol?
    a) Ethernet
    b) TCP
    c) HTTP
    d) ISP

26. The PPP of the OSI model operates at ----------
    a) Physical layer
    b) Data link layer
    c) Network layer
    d) Transport layer

27. Which of the following is a type of routing algorithm used in the network layer?
    a) Link-state routing
    b) Distance-vector routing
    c) Path-vector routing
    d) All of the above.

28. Which protocol is responsible for error detection and correction at the transport layer?
    a) TCP
    b) UDP
    c) ICMP
    d) ARP

29. Which application layer protocol is used for sending and receiving emails?
    a) HTTP
    b) FTP
    c) SMTP
    d) POP

30. Which of the following is not a common type of firewall?
    a) Packet-filtering firewall
    b) Stateful inspection firewall
    c) Proxy firewall
    d) Encryption firewall

31. What are the basic limitations of finite state machine?
    a) It cannot remember grammar for a language
    b) It cannot remember arbitrarily large amount of information
    c) It cannot remember language generated from a grammar
    d) In cannot remember state transitions

32. Which of the following Machine is specific for Context free grammar?
    a) Finite state automata
    b) Push down automata
    c) Linear bounded automata
    d) Turing Machine

33. Turing machine (TM) is more powerful than FMS (Finite State Machine) because
    a) tape movement is confined to one direction
    b) it has no finite state
    c) it has the capability to remember arbitrarily long sequences of input symbols
    d) it has finite state

34. Which of these clustering technique permits a convenient graphical display?
    a) Agglomerative clustering
    b) Hierarchical clustering
    c) Probabilistic model-based clustering
    d) Partition-based clustering

35. A straight line segment is translated by applying the transformation equation
    a) P'=P+T
    b) Dx and Dy
    c) P'=P+P
    d) Cy

36. What does composite transformations means?
    a) Transformations that can be done in sequence
    b) Transformations that cannot be done in sequence
    c) Transformations that can be done simultaneously
    d) Transformations that cannot be done simultaneously

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 of the following testing is sometime called as Acceptance testing?
    a) White-box testing
    b) Grey box testing
    c) Alpha testing
    d) Beta testing

46. What is the purpose of representing system behaviour in OOAD?
    a) To document system architecture and components
    b) To identify potential risks and challenges
    c) To understand and model the dynamic aspects of the system
    d) To create user interfaces and interactions

47. In object-oriented design, what does visibility refer to?

a) The physical appearance of an object.
b) The accessibility of class members from other parts of the program.
c) The process of creating instances of classes.
d) The relationship between classes in a system.

48. How are relationships between classes represented when mapping design to code?
a) Through inheritance and implementation of interfaces.
b) Through the use of composition and aggregation.
c) Through static method calls and global variables.
d) Through conditional statements and loops.

49. In which type of environment, the next state of the environment is completely determined by the current state and the action taken by the agent?
a) Observable environment
b) Deterministic environment
c) Episodic environment
d) Static environment

50. Which searching technique is guaranteed to find the optimal solution in a state space search problem, assuming no path costs?
a) Depth-first search (DFS)
b) Breadth-first search (BFS)
c) Hill climbing
d) A* search

51. What is the main goal of the resolution algorithm in inference?
a) To derive new logical axioms
b) To simplify logical expressions
c) To prove the satisfiability or un-satisfiability of a given set of logical statements
d) To find contradictions in the knowledge base

52. What is the main goal of natural language understanding (NLU)?
a) Translating text from one language to another
b) Generating human-like responses to user queries
c) Analyzing and interpreting the meaning of natural language text
d) Extracting entities and their relationships from a text

53. What is fuzzy learning in machine learning?
a) A type of learning algorithm that uses fuzzy logic to handle uncertain or imprecise data
b) A learning technique that focuses on training neural networks with fuzzy inputs
c) A method that uses fuzzy inference to make predictions based on labelled data
d) A learning approach that emphasizes the use of fuzzy clustering algorithms

54. Which neural network architecture is commonly used for processing sequential data, such as time series or natural language?

a) Feed-forward neural network (FNN)
b) Self-organizing map (SOM)
c) Radial basis function network (RBFN)
d) Recurrent neural network (RNN)

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. Output of the program below will be ----------

```
#include <iostream>
   class Encapsulation {
      private:    int data;

      public:  Encapsulation() : data(0) {}

      void setData(int value) {
                        data = value;
                        }
       int getData() {
                        return data;
                        }
      };
```

```
int main() {
        Encapsulation obj;
        std::cout << obj.getData() << std::endl;
         return 0;
        }
```

a) 0
b) Garbage value
c) Compilation error
d) Runtime error

66. 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

67. What is the result of the (0x5A3D - 0x28F1) + 0xABCD in hexadecimal notation?
a) 0x8D7F
b) 0x8E7E
c) 0x8F7D
d) 0x907C

68. What is the output of the y <= (a and b) xor (not b and c); VHDL code?
a) AND gate
b) OR gate
c) XOR gate
d) NAND gate

69. What is the data rate required to transmit signal with max frequency component of 10KHz for 8 bit per symbol?
a) 80 KBPs
b) 160 KBPs
c) < 160 KBPs
d) < 80 KBPs

70. A data packet of size 1500 bytes is to be transmitted over a network crossing 2 routers in between. Each network layer adds a header of 20 bytes. The packet is then encapsulated by a data link layer that adds a header of 30 bytes and a trailer of 10 bytes. What is the total size of the packet, including all headers and the data payload?
a) 1550 bytes

b) 1560 bytes
c) 1620 bytes
d) 1680 bytes

71. Consider CFG with {S,A,B} as the non-terminal alphabet, {a,b} as the terminal alphabet, S as the start symbol and the following set of production rules S->aB S->bA B->aB->bS A->aS B->aBB A-> bAA which of the following strings is generated by grammar ?
a) aaaabb
b) aabbbb
c) aabbab
d) abbbba

72. An efficient transformation method which produces a parallel mirror image of an object is also referred as,
a) Rotation
b) Reflection
c) Shear
d) Rotation and shear

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.

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

What is the average waiting time?
a) 2
b) 3
c) 4
d) 5

75. Which of the following statements best describes the role of a configuration management tool in software engineering?

a) It helps a graphical user interface for designing software architectures.
b) It helps the process of generating code from high-level models or specifications.
c) It helps track, control, and manage changes to software artifacts throughout the development lifecycle.
d) It helps the testing and debugging software applications to ensure their correctness.

76. What is the correct order of phases in the Object-Oriented Development Cycle?
a) Analysis, Design, Implementation, Testing, Maintenance
b) Design, Analysis, Implementation, Maintenance, Testing
c) Analysis, Design, Implementation, Maintenance, Testing
d) Design, Analysis, Testing, Implementation, Maintenance

77. Greedy Best-First Search is an informed search algorithm that:
a) Expands nodes based on their depth in the search tree
b) Expands nodes based on their evaluation function value
c) Expands nodes randomly without any heuristic guidance
d) Expands nodes in a breadth-first manner

78. Which of the following activation functions is commonly used for the output layer of a binary classification neural network?
a) Sigmoid activation function
b) Tanh activation function
c) ReLU activation function
d) Softmax activation function

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