Nepal Engineering Council Registration Examination

Model Question for Electrical and Electronics Engineering (AEEE)

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. At series resonance, the voltage across L or C is
   a) Equal to applied voltage
   b) Less than applied voltage
   c) Much more than applied voltage
   d) Equal to voltage across R

5. The minimum phase transfer function is the one having …….
   a) Poles and zeros in right hand side
   b) Poles and zeros in left hand side
   c) Poles in left hand side and zeros in right hand side
   d) Poles in right hand side and zeros in left hand side

6. If the polynomial P(s) and its derivative gives a continued fraction expansion with …… coefficients, then the polynomial P(s) is Hurwitz.
   a) All negative
   b) All positive
   c) Positive or negative
   d) Positive and negative

7. Which of the following device has negative resistance?
   a) Gas diode
   b) Vacuum diode

c) Tunnel diode
d) None of the above

8. A MOSFET uses the electric field of a …… to control the channel current.
a) Capacitor
b) Battery
c) Generator
d) None of the above

9. An oscillator produces oscillations due to ……..
a) Positive feedback
b) Negative feedback
c) Partly positive and partly negative feedback
d) Neither positive nor negative feedback

10. The noise factor of an ideal amplifier is ……. dB.
a) 0
b) 0.5
c) 5
d) 10

11. Logarithmic amplifiers are used in …….
a) Adders
b) Dividers
c) Multipliers
d) All of the above

12. In standard TTL, the 'totem pole' refers to …..
a) Multi-emitter input stage
b) The phase splitter
c) Open collector output stage
d) The output buffer

13. Two's compliment of 00011011 is:
a) 11100100
b) 11100101
c) 11000101
d) 11110001

14. Elementary building block of combinational circuit is:
a) Logic gate
b) Flip-flop
c) Both logic gate and flip-flop
d) Memory

15. Synchronous circuit that changes its state at specific clock signal is:
a) Event driven

b) Clock driven
c) Pulse driven
d) Frequency driven

16. Bandwidth of microprocessor represents:
    a) Clock speed
    b) Width of internal bus
    c) Number of bit processed/instruction
    d) Number of bit processed/sec

17. PPI 8255 has internal bus of size:
    a) 4 bit
    b) 8 bit
    c) 16 bit
    d) 32 bit

18. RISC is characterized by ……
    a) Hardwired control design with no micro codes
    b) Fixed instruction format
    c) Executing most of the instructions in a single clock cycle
    d) All of the above

19. Which among of the following doesn't come under object-oriented programming concept?
    a) Data hiding
    b) Message passing
    c) Platform independent
    d) Data binding

20. If statement condition is always written in ……. Parenthesis.
    a) Square []
    b) Curly {}
    c) Angle <>
    d) Small ()

21. Recursive function is similar to ……. .
    a) Switch case
    b) Loop
    c) If-else
    d) Do loop

22. In general, the index of the first element in an array is …….. .
    a) 0
    b) -1
    c) 2
    d) 1

23. Programmers use …….. when they need to pass a group of related variables.
    a) Structure variable
    b) Variable
    c) Auto variable
    d) Constant variable

24. If same message is passed to objects of several different classes and all of those can respond in a different way, this feature is called ……. .
    a) Inheritance
    b) Overloading
    c) Polymorphism
    d) Over-riding

25. The static error of an instrument implies the
    a) Difference between the measured value and the true value of the quantity
    b) Accuracy of the instrument
    c) Error introduced in low varying inputs
    d) Irreparability of the instrument

26. Sensitivity of a sensor can be depicted by …… .
    a) Nyquist plot
    b) Pole – zero plot
    c) Bode plot
    d) Box plot

27. In a circuit, an ammeter is always connected in …… .
    a) Series
    b) Parallel
    c) Both parallel and series
    d) None of the above

28. Which of the following is not a characteristic of an open loop system?
    a) It is inaccurate.
    b) It is economical.
    c) It has small bandwidth.
    d) It has feedback elements.

29. First order system is defined by …….
    a) Number of poles at origin
    b) Order of differential equation
    c) Total number of poles of the equation
    d) Total number of poles and order of the equation

30. Root locus always starts from ……
    a) The open loop poles and terminates at the open loop zeros.
    b) The open loop zeros and terminates at the open loop poles.

c) The close loop poles and terminates at the open loop zeros.
d) The close loop poles and terminates at the close loop zeros.

31. In an ideal transformer, the no load primary current I_0
a) Lags behind V_1 by 90^0
b) Is in phase with V_1
c) Leads V_1 by 90^0
d) Lags V_1 by an angle lying between 0^0 and 90^0

32. The function of brushes in a DC generator is to…….
a) Hold the armature winding
b) Provide a low reluctance path for the magnetic flux
c) Convert AC to DC
d) Collect current from the commutator

33. The speed of a DC motor can be varied by varying ……
a) Field current
b) Applied voltage
c) Resistance in series with armature
d) Any of the above

34. An induction motor is ……..
a) Self starting with zero torque
b) Self starting with high torque
c) Self starting with low torque
d) Non-self starting

35. When the speed of a synchronous generator increases, then ……
a) The frequency increases
b) The frequency decreases
c) The frequency remains constant but the power factor decreases
d) Power factor and frequency remains constant

36. When any one phase of a 3-phase synchronous motor is short-circuited, the motor ……
a) Will overheat in the spot
b) Will fail to pull into step
c) Will refuse to start
d) Will not come up to speed

37. In an analog communication, a unit impulse response of a causal system is …… for $t<0$.
a) 0
b) 1
c) Infinite
d) -1

38. If the gain crossover frequency of a system is less than its phase cross over frequency, then the system is …….
    a) Critically stable
    b) Unstable
    c) Stable
    d) Marginally stable

39. In inverse DTFT, the limits of the integral is defined between $-\pi$ to π because of the property ……
    a) Time invariance
    b) Periodicity
    c) Implication
    d) Convolution

40. One-sided z-transform is also known as …….
    a) Unilateral z-transform
    b) Bilateral z-transform
    c) Trilateral z-transform
    d) None of the above

41. What is the stability of the system $S^3 + S^2 + S + 4 = 0$ using Hurwitz criteria?
    a) Unstable
    b) Stable
    c) Critically stable
    d) Marginally stable

42. The transfer function of FIR filters will have ……
    a) Poles and zeros
    b) Only poles
    c) Only zeros
    d) Only constants

43. Which modulation is used in microwave band?
    a) Amplitude modulation
    b) Pulse modulation
    c) Frequency modulation
    d) Phase modulation

44. Thermal noise is independent of ……
    a) Boltzmann's constant
    b) Temperature
    c) Bandwidth
    d) Centre frequency

45. ……. is mostly preferred for telegraphy.
    a) Single tone modulation

b) On-off keying
c) Frequency shift keying
d) Pulse code modulation

46. The process of converting the analog sample into discrete form is called …….
a) Quantization
b) Sampling
c) Multiplexing
d) Modulation

47. Which of the following is not a property of block code?
a) Linearity
b) Systematic
c) Cyclic
d) Non-linearity

48. The open standard interconnection (OSI) model is a …… layer model for the design of network system.
a) Two
b) Five
c) Seven
d) Eight

49. Which of the following pollutant causes acid rain?
a) NO_2
b) SO_2
c) CO_2
d) NO

50. What is the purpose of impedance matching in transmission lines?
a) To reduce signal reflection
b) To increase signal reflection
c) To reduce signal attenuation
d) To increase signal attenuation

51. The primary function of the fuse is to ……
a) Open the circuit
b) Protect the appliance
c) Protect the line
d) Prevent excessive current flow through the circuit

52. Which type of wiring is suitable for multi-storey buildings?
a) Tree system
b) Ring main system
c) Distribution board system
d) Ring main and distribution board system

53. Input ripple of SMPS is ……..
    a) High
    b) Low
    c) Nil
    d) Very low

54. …….. is a series type unbalanced fault that occurs in a power system.
    a) Line to line fault
    b) Double line to ground fault
    c) Single line to ground fault
    d) Open conductor fault

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. If P is the power of a star connected system, then the power of an equivalent delta connected system will be …….
a) P
b) 2P
c) 3P
d) P/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. If a transistor connected in a common base configuration has emitter current (I_E)= 2mA and base current (I_B) = 20μA, then the current gain α will be …..
a) 0.95
b) 1.98
c) 0.99
d) 0.98

64. A low pass filter in phase-locked loop …….
a) Improves low frequency noise
b) Removes high frequency noise
c) Tracks the voltage changes
d) Changes the input frequency

65. Convert $(312)_8$ into decimal:
a) $(200)_{10}$
b) $(202)_{10}$
c) $(204)_{10}$
d) $(206)_{10}$

66. 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

67. Which of the following data type will throw an error on modulus operation (%)?
    a) Char
    d) Short
    c) Int
    d) Float

68. Assuming that an int is of 4 bytes, what will be the size of int arr[15]?
    a) 15
    b) 19
    c) 11
    d) 60

69. For a 12-bit ADC with voltage range of 0-5 V, what will be the resolution?
    a) 2.44mV
    b) 0.416mV
    c) 2.4mV
    d) 1.22mV

70. The characteristic equation of a feedback system is $S^3 + KS^2 + 5S + 10 = 0$. For a stable system, the value of k should not be less than ……..
    a) 1
    b) 2
    c) 3
    d) 4.5

71. In a 4-pole, 20KW, 200 V wave wound DC shunt generator, the current in each parallel path will be …….
    a) 100 A
    b) 25 A
    c) 10 A
    d) 50 A

72. The eddy current loss is proportional to the …….
    a) Frequency
    b) Square of frequency
    c) Cube of frequency
    d) Square root of frequency

73. A system is given by $x(t)=e^{at}u(t)$ $(a>0)$. The system is …….
    a) Causal and stable
    b) Non-causal and stable
    c) Causal and unstable
    d) Anti-causal and stable

74. What is the value of magnitude frequency response of a Butterworth low pass filter at $\Omega=0$?
    a) 0
    b) 1
    c) $1/\sqrt{2}$
    d) $\sqrt{2}$

75. In a digital communication system, the bit rate is 5000 bps and each symbol represent 4 bits. What is the baud rate in symbols per second?
    a. 1000 symbols per second
    b. 1250 symbols per second
    c. 2000 symbols per second
    d. 5000 symbols per second

76. A data communication system has a bandwidth of 10 MHz and uses 8-level pulse amplitude modulation (PAM) with each level representing 2 bits. What is the maximum data rate that can be achieved?
    a. 20 Mbps
    b. 40 Mbps
    c. 50 Mbps
    d. 60 Mbps

77. The zero sequence current of a generator for line to ground faults is j 3.0 p.u . find the current through the neutral during the fault.
    a) j 3.0 p.u
    b) j 1.0 p.u
    c) j 9.0 p.u
    d) j 0.9 p.u

78. What is the average demand of the maximum demand of generation of power is 50 MW and the load factor of the plant is 60 %.
    a) 30 MW
    b) 300 MW
    c) 20 MW
    d) 40 MW

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