

Regional Science Centre, Bhubaneswar

(National Council of Science Museums)

Aptitude Test

Full Marks: 100

Post: Technical Assistant-A (Electronics)

Time: 3 hours

Name: _____

Roll no: _____

Mobile phone No: _____

Email ID: _____

Signature: _____

Date: _____

General instructions:

All questions are compulsory.

There is no negative marking for wrong answers.

Section A

Section A: There are 50 questions in all. Put a tick mark on the best option out of the four given options. **50 Marks**

1. For best operation of a BJT, which region must the operating point be set at?
 - a). Active region
 - b). Cut-off region
 - c). Saturation region
 - d). Reverse active region

2. For a n-p-n transistor, the collector current changed from 0.2mA to 0.22mA resulting a change of base emitter voltage from 0.8v to 0.8005 V. What is the value of Stability factor?
 - a). 0
 - b). 0.25
 - c). 0.04
 - d). 0.333

3. For an ideal transistor having a fixed bias configuration, what will be the value of Beta?
- 0
 - 2
 - 1
 - 1
4. Which of the following has a negative temperature coefficient of resistance?
- capacitor
 - diode
 - thermistor
 - sensistor
5. Which of the following statements are true?
- P: JFET is biased to operate it in active region
Q: MOSFET is biased to operate it in saturation region
- Both P and Q are correct
 - P is correct and Q is incorrect
 - P is incorrect and Q is correct
 - Both P and Q are incorrect
6. Which among the following act as a switch in switching regulator?
- Rectifiers
 - Diode
 - Transistors
 - Relays
7. In a half wave rectifier, the sine wave input is $200\sin 300t$. The average value of output voltage is?
- 57.876V
 - 67.453V
 - 63.694V
 - 76.987V
8. If peak voltage for a half wave rectifier circuit is 5V and diode cut in voltage is 0.7, then peak inverse voltage on diode will be?
- 5V
 - 4.9V
 - 4.3V
 - 6.7V
9. A full wave rectifier delivers 50W to a load of 200Ω. If the ripple factor is 2%, calculate the AC ripple across the load.
- 2V
 - 5V
 - 4V
 - 1V

10. SPMS are based on the _____ principle.
- a) Phase control
 - b) Integral control
 - c) Chopper
 - d) MOSFET
11. Which of the following can be used as a comparator?
- a) Zener diode
 - b) Diode
 - c) Operational amplifier
 - d) All of the mentioned
12. Product-of-Sums expressions can be implemented using
- a) 2-level OR-AND logic circuits
 - b) 2-level NOR logic circuits
 - c) 2-level XOR logic circuits
 - d) Both 2-level OR-AND and NOR logic circuits
13. A basic multiplexer principle can be demonstrated through the use of a
- a) Single-pole relay
 - b) DPDT switch
 - c) Rotary switch
 - d) Linear stepper
14. The sequential circuit is also called _____
- a) Flip-flop
 - b) Latch
 - c) Strobe
 - d) Adder
15. How many $8\text{ k} \times 1$ RAMs are required to achieve a memory with a word capacity of 8 k and a word length of eight bits?
- a) Eight
 - b) Two
 - c) One
 - d) Four
16. The chip by which both the operation of read and write is performed
- a) RAM
 - b) ROM
 - c) PROM
 - d) EPROM
17. PLA is used to implement _____
- a) A complex sequential circuit
 - b) A simple sequential circuit
 - c) A complex combinational circuit
 - d) A simple combinational circuit

18. Which logic is the fastest of all the logic families?
- a) TTL
 - b) ECL
 - c) HTL
 - d) DTL
19. Two processors A and B have clock frequencies of 700 Mhz and 900 Mhz respectively. Suppose A can execute an instruction with an average of 3 steps and B can execute with an average of 5 steps. For the execution of the same instruction which processor is faster?
- a) A
 - b) B
 - c) Both take the same time
 - d) Insufficient information
20. The addressing mode, where you directly specify the operand value is
- a) Immediate
 - b) Direct
 - c) Definite
 - d) Relative
21. While implementing logic operation on gray-scale images, the processing of pixel values is done as _____
- a) String of integer numbers
 - b) String of floating numbers
 - c) String of binary numbers
 - d) None of the mentioned
22. Which of the following is a combination of several processors on a single chip?
- a) Multicore architecture
 - b) RISC architecture
 - c) CISC architecture
 - d) Subword parallelism
23. When the data at a location in cache is different from the data located in the main memory, the cache is called _____
- a) Unique
 - b) Inconsistent
 - c) Variable
 - d) Fault
24. To extend the connectivity of the processor bus we use
- a) PCI bus
 - b) SCSI bus
 - c) Controllers
 - d) Multiple bus

25. A term that refers to the way in which the nodes of a network are linked together.
- a) network
 - b) topology
 - c) connection
 - d) interconnectivity
26. The labels or constants that can be used by any module in the program is possible when they are declared as
- a) Public
 - b) Local
 - c) Global
 - d) Either public or global
27. The utility program used to bring the object code into memory for execution is
- a) Loader
 - b) Fetcher
 - c) Extractor
 - d) Linker
28. The instructions that are used to call a subroutine from the main program and return to the main program after execution of called function are
- a) CALL, JMP
 - b) JMP, IRET
 - c) CALL, RET
 - d) JMP, RET
29. Calculate the conversion time of a 12-bit counter type ADC with 1MHz clock frequent to convert a full scale input?
- a) 4.095 us
 - b) 4.095ms
 - c) 4.095s
 - d) None of the mentioned
30. How many rows and columns are present in a 16*2 alphanumeric LCD?
- a) rows=2, columns=32
 - b) rows=16, columns=2
 - c) rows=16, columns=16
 - d) rows=2, columns=16
31. A stepper motor having a resolution of 300 steps/rev and running at 2400 rpm has a pulse rate of-_____pps.
- a) 4000
 - b) 8000
 - c) 6000
 - d) 10,000

39. Which of these method is used to tell the calling thread to give up a monitor and go to sleep until some other thread enters the same monitor?
- a) wait()
 - b) notify()
 - c) notify All()
 - d) sleep()
40. Who invented OOP?
- a) Alan Kay
 - b) Andrea Ferro
 - c) Dennis Ritchie
 - d) Adele Goldberg
41. Which Feature of OOP illustrated the code reusability?
- a) Polymorphism
 - b) Abstraction
 - c) Encapsulation
 - d) Inheritance
42. In a machine instruction format, S-bit is the
- a) status bit
 - b) sign bit
 - c) sign extension bit
 - d) none of the mentioned
43. The addressing mode/s, which uses the PC instead of a general purpose register is
- a) Indexed with offset 4
 - b) Relative
 - c) Direct
 - d) Both indexed with offset and direct
44. An interrupt breaks the execution of instructions and diverts its execution to
- a) Interrupt service routine
 - b) Counter word register
 - c) Execution unit
 - d) Control unit
45. The instruction that performs logical AND operation and the result of the operation is not available is
- a) AAA
 - b) AND
 - c) TEST
 - d) XOR

46. Which one of the following is volatile in nature?

- a) ROM
- b) EPROM
- c) PROM
- d) RAM

47. In FPGA, vertical and horizontal directions are separated by _____

- a) A line
- b) A channel
- c) A strobe
- d) A flip-flop

48. The maximum noise voltage that may appear at the input of a logic gate without changing the logical state of its output is termed as

- a) Noise Margin
- b) Noise Immunity
- c) White Noise
- d) Signal to Noise Ratio

49. The octal equivalent of the decimal number (417)₁₀ is

- a) (641)₈
- b) (619)₈
- c) (640)₈
- d) (598)₈

50. Which of the following logic families has the shortest propagation delay?

- a) S-TTL
- b) AS-TTL
- c) HS-TTL
- d) HCMOS

Section B:

Q1. Consider the circuit in Figure 1. Assume that the input C is driven by a square wave signal with a 50% duty cycle. Draw a timing diagram that shows the waveforms at points A and B . Assume that the propagation delay through each gate is Δ seconds. **10 Marks**

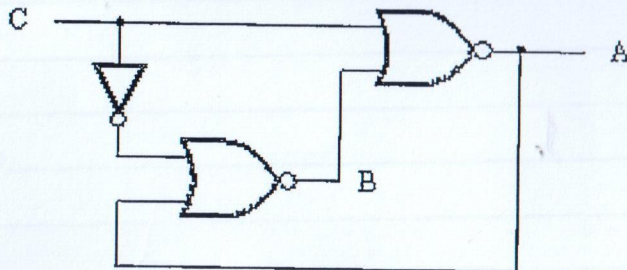


Figure 1

Q2. Draw a flow chart for an automatic vending machine for tea/coffee. It can maximum accept Rs. 100 note. Cost of tea is Rs. 20 and coffee Rs.50. **10 Marks**

Q3. Give brief description of following. (2X5)

10 Marks

- RS-232
- Arduino uno
- Raspberry Pi
- TRAP
- Android

Section C

Q1. Design a Mod-10 counter using JK Flip Flops. Using this counter draw schematic block diagram of a single digit decimal counter using seven segment display. **20 Marks**

Regional Science Centre, Bhubaneswar

(National Council of Science Museums)

Aptitude Test

Full Marks: 100

Post: Technical Assistant-A (Electronics)

Time: 3 hours

Name: _____

Roll no: _____

Mobile phone No: _____

Email ID: _____

Signature: _____

Date: _____

General instructions:

All questions are compulsory.

There is no negative marking for wrong answers.

Section A

Section A: There are 50 questions in all. Put a tick mark on the best option out of the four given options. **50 Marks**

1. For best operation of a BJT, which region must the operating point be set at?
 - a). Active region
 - b). Cut-off region
 - c). Saturation region
 - d). Reverse active region

2. For a n-p-n transistor, the collector current changed from 0.2mA to 0.22mA resulting a change of base emitter voltage from 0.8v to 0.8005 V. What is the value of Stability factor?
 - a). 0
 - b). 0.25
 - c). 0.04
 - d). 0.333