Important Instructions:

- The duration of the paper is **2 (two) hours**.
- The medium of instruction and questions is English.
- The paper has **50 questions** and **12 pages**.
- All questions are of the MCQ (Multiple Choice Questions) type.
- All questions should be answered.
- Each question will have 5 (five) choices with **one or more** correct answers.
- All questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from 0 **(All the incorrect choices are marked & no correct choices are marked)** to +1 **(All the correct choices are marked & no incorrect choices are marked)**.
- Answers should be marked on the special answer sheet provided.
- Note that questions appear on both sides of the paper. If a page is not printed, please inform the supervisor immediately.
- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked. **Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.**
1) Which of the following device(s) was/were developed by Herman Hollerith?

(a) ADA  
(b) Punch Card Reader  
(c) ENIAC  
(d) Differential Engine  
(e) Analytical Engine

2) Which of the following device(s) can be used to read the answers marked as shaded circles in a multiple choice question paper?

(a) Digitizer  
(b) Light Pen  
(c) Magnetic Ink Character Reader  
(d) Scanner  
(e) Plotter

3) Which of the following device(s) is/are not (a) part(s) of a microprocessor?

(a) Arithmetic Logic Unit  
(b) Control Unit  
(c) Random Access Memory  
(d) Registers  
(e) Level 1 Cache Memory

4) Which component(s) is/ are essential part(s) of a Von Neumann computer system?

(a) A mechanism for transferring data to and from the outside world.  
(b) Pattern driven computing model to extract unique patterns.  
(c) A memory to store both data and instructions.  
(d) A processor to interpret and execute instructions.  
(e) Personal Information Manager (PIM) software.

5) What is the binary number equivalent of the hexadecimal number CBAD?

(a) 1100 1011 1100 1101  
(b) 1100 1011 1010 1101  
(c) 1100 1011 1010 1110  
(d) 1011 1110 0101 1101  
(e) 1100 1100 1010 1011
6) Which of the following is the range of integers that can be represented using one's complement notation on an n-bit register?

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>0 to $+2^{(n-1)}$</td>
</tr>
<tr>
<td>(b)</td>
<td>$-2^{(n-1)}$ to $+(2^{(n-1)} - 1)$</td>
</tr>
<tr>
<td>(c)</td>
<td>$-2^{(n-1)}$ to $(2^n - 1)$</td>
</tr>
<tr>
<td>(d)</td>
<td>$-2^{(n-1)}$ to $+2^{(n-1)}$</td>
</tr>
<tr>
<td>(e)</td>
<td>0 to $+2^{n-1}$</td>
</tr>
</tbody>
</table>

7) The number **0111111111111111** in the form of Two's Compliment is equivalent to decimal number

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>+65535</td>
</tr>
<tr>
<td>(b)</td>
<td>+32768</td>
</tr>
<tr>
<td>(c)</td>
<td>-1</td>
</tr>
<tr>
<td>(d)</td>
<td>+32767</td>
</tr>
<tr>
<td>(e)</td>
<td>+1</td>
</tr>
</tbody>
</table>

8) Which of the following is the correct 16-bit floating point representation with a sign bit, 5-bit exponent and 10-bit mantissa of the decimal number +47.625?

<table>
<thead>
<tr>
<th>Option</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>1 10010 0111110100</td>
</tr>
<tr>
<td>(b)</td>
<td>0 01111 101111010</td>
</tr>
<tr>
<td>(c)</td>
<td>0 01110 01111111101</td>
</tr>
<tr>
<td>(d)</td>
<td>0 10100 011110100</td>
</tr>
<tr>
<td>(e)</td>
<td>0 10100 101110011</td>
</tr>
</tbody>
</table>

9) What is the loss of accuracy (round-off-error) when converting the decimal value +255.9375 to 16-bit floating point representation with a sign bit, 5-bit exponent and a 10-bit mantissa?

<table>
<thead>
<tr>
<th>Option</th>
<th>Error Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>0.0625</td>
</tr>
<tr>
<td>(d)</td>
<td>0.25</td>
</tr>
<tr>
<td>(b)</td>
<td>0.125</td>
</tr>
<tr>
<td>(e)</td>
<td>0.5</td>
</tr>
<tr>
<td>(c)</td>
<td>0.1875</td>
</tr>
</tbody>
</table>

10) Which of the following is equivalent to the decimal number “minus 11” in the form of a 16 bit Two’s Compliment number is

<table>
<thead>
<tr>
<th>Option</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>011111111111101</td>
</tr>
<tr>
<td>(b)</td>
<td>111111111111010</td>
</tr>
<tr>
<td>(c)</td>
<td>100000000000101</td>
</tr>
<tr>
<td>(d)</td>
<td>111111111111010</td>
</tr>
<tr>
<td>(e)</td>
<td>111111111110010</td>
</tr>
</tbody>
</table>
11) The IEEE standard 32-bit floating point representation of the binary number 32.5 is

(a) 0 01111111 110000000000000000000000
(b) 1 10000011 000011000000000000000000
(c) 0 10000100 000001000000000000000000
(d) 0 10000111 000001000000000000000000
(e) 0 11000001 111000000000000000000000

12) The equivalent decimal number to the IEEE standard 32-bit floating point representation of 1 10000011 111111000000000000000000 is

(a) -16.875  (b) -63.5  (c) -127
(d) -31.5  (e) -31.75

13) Output of the Boolean function \( F(x, y, z) = x \overline{y} + \overline{z}x + yz \) is 0 when

(a) x=1, y=1, z=0  (b) x=1, y=0, z=1  (c) x=1, y=1, z=1
(d) x=0, y=1, z=1  (e) x=0, y=1, z=0

14) Consider the following truth table:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>F(A,B,C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
<td>1</td>
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<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Which of the following expression(s) is/are represented by the Boolean function \( F(A,B,C) \)?

(a) \( AB + \overline{A}B \)  (b) \( AB + \overline{A} \overline{B} \)  (c) \( \overline{B} \)
(d) \( \overline{A} \)  (e) \( B \)
15) The Boolean function $F = P + \overline{Q}R$ is equivalent to

- i. $(P + \overline{Q})(P + R)$
- ii. $(P + \overline{Q})(P + R)$
- iii. $P + (\overline{Q} + R)$
- iv. $P \cdot (\overline{Q} + R)$
- v. $P + \overline{Q} + R$

(a) Only (i) and (iii)  
(b) Only (ii) and (iii)  
(c) Only (ii) and (v)  
(d) Only (i), (iii) and (iv)  
(e) Only (iii) and (iv)

16) Consider the following Boolean function

$$F(P, Q, R) = (P + \overline{Q} + \overline{R})(P + \overline{Q}R)$$

Which of the Boolean function(s) provide a simplified expression of F?

- (a) $Q + P\overline{R}$  
- (b) $P\overline{Q} + Q\overline{R}$  
- (c) $P + Q\overline{R}$  
- (d) $P\overline{Q} + P\overline{R} + QR$  
- (e) $P + Q\overline{R}$

17) Consider the following Karnaugh map.

| A\ B | C \ D |
|------|--|---|---|---|---|---|---|---|
| 00   | 1 | 1 | 1 | 1 | | | | |
| 01   | 1 | 0 | 0 | 1 | | | | |
| 11   | 0 | 0 | 0 | 0 | | | | |
| 10   | 1 | 0 | 0 | 1 | | | | |

What is the most compact Boolean function that represents the above Karnaugh map?

- (a) $\overline{B}C + \overline{B}D + \overline{C}D$  
- (b) $\overline{C}D + \overline{B}C + \overline{AB}D + A\overline{BD}$  
- (c) $\overline{C}D + \overline{BD} + \overline{ABC} + \overline{AB}C$  
- (d) $B.C + B.\overline{D} + \overline{C}D$  
- (e) $\overline{B}.C + B.\overline{D} + C\overline{D}$
18) How many NAND gates are required for the logic function F, if it is to be implemented using NAND gates only?

\[ F = \overline{C \overline{A}} + B\overline{C} + A\overline{B} \]

(a) 4  (b) 5  (c) 6  
(d) 7  (e) 8

19) Which of the following statement(s) is/are true with respect to the Central Processing Unit (CPU)?

(a) The Program Counter (PC) holds the memory address of the instruction in execution.
(b) Only the Operations-Code is transferred to the Control Unit.
(c) An instruction in the Instruction Register (IR) consists of the Operations-Code and one or more Operands.
(d) The value of the Program Counter (PC) is incremented by 1 (word size) once its content has been read to the Memory Address Register.
(e) The instruction is transferred to the Instruction Register (IR) from the Main Memory before it is transferred to the Memory Buffer Register (MBR).

20) Given below are some statements about cache memory. Identify the correct statement(s) from among them.

(a) Cache memory enhances overall execution performance by providing a faster memory access time.
(b) Level 1 cache is always faster than the Level 2 Cache.
(c) Level 2 cache is used every time a Level 1 cache miss occurs.
(d) In modern computers, the Level 2 cache is referred as the external cache.
(e) We define a cache miss to be caused by a reference to an item that is not resident in main memory.
Questions 21, 22, 23 and 24 are based on the following:

A two-word instruction is stored in memory at address 300 and 301. The instruction is **LOAD $R1, 800**. The contents of memory addresses 800, 900, 1000 and 1100 are 900, 1000, 700 and 500 respectively. The content of indexed (base) register is 300.

21) What is the value loaded into register $R1$ after the execution of the instruction, if the addressing mode is Immediate?

(a) 500  (b) 700  (c) 800
(d) 900  (e) 1000

22) What is the value loaded into register $R1$ after the execution of the instruction, if the addressing mode is Direct?

(a) 500  (b) 700  (c) 800
(d) 900  (e) 1000

23) What is the value loaded into register $R1$ after the execution of the instruction, if the addressing mode is Indirect?

(a) 500  (b) 700  (c) 800
(d) 900  (e) 1000

24) What is the value loaded into register $R1$ after the execution of the instruction, if the addressing mode is Indexed (Base)?

(a) 500  (b) 700  (c) 800
(d) 900  (e) 1000

25) Which of the following can be categorized as solid-state memory device(s)?

(a) Flash Memory Drive  (b) Hard Disk  (c) MP3 Player
(d) CD-RW  (e) Floppy Disk
26) Which of the following technologies is/are not used as internal cache memory?

(a) SRAM  
(b) DRAM  
(c) EEPROM  
(d) RDRAM  
(e) DDR SDRAM

27) Which of the following is/are not considered as magnetic storage device(s)?

(a) CompactDisks  
(b) PunchCard  
(c) Zip Disk  
(d) Floppy Disks  
(e) Recording Tapes

28) Which of the following memory is/are referred to as “Fast page mode DRAM”?

(a) Page Mode DRAM  
(b) RDRAM  
(c) FPRAM  
(d) FPMDRAM  
(e) MPDRAM

29) Which of the following printer(s) use Ink Cartridges to print in colour?

(a) Colour Inkjet Plotter  
(b) Liquid Ink Electrostatic printer  
(c) LaserJet  
(d) Photo printer  
(e) Dye-Sublimation printer

30) Which of the following device(s) is/are biometric device(s)?

(a) IRIS Scanners  
(b) DVD Camcorders  
(c) Smart Card Readers  
(d) Fingerprint Readers  
(e) OCR Devices

31) Which of the following device(s) is/are used to produce 3-Dimensional displays?

(a) Overhead Projector  
(b) Holographic display  
(c) Digital projector  
(d) Varifocal mirror display  
(e) Stereoscopy

32) Which of the following technology (or technologies) is/are used to set up a short range point-to-point communication?

(a) IrDA  
(b) RFID (Radio Frequency Identification)  
(c) TransferJet  
(d) Bluetooth  
(e) DSRC (Dedicated Short Range Communication)
33) Which of the following is /are (a) functionality/ functionalities of an Operating System?

(a) Translates user commands to a form that can be understood by the relevant computer component.
(b) Creates a logical file structure on the computer hard disk so that user data can be stored and retrieved easily.
(c) While allocating portions of main memory to programs at their request, freeing the allowed memory for reuse when no longer needed.
(d) Reduces the resolution of high quality images to the required level when the file sizes exceed the capacity expected by an application.
(e) Executes special programs to repair damaged files and backup data.

34) Which of the following statement(s) is/are true with regards to Wi-Fi?

(a) The speed of an IEEE 802.11b network is much higher than that of an IEEE 802.11g network.
(b) Wi-Fi refers to the IEEE 802.11b wireless Ethernet standard.
(c) The maximum speed of a Wi-Fi network is 11Mbps.
(d) Access points are a must in-order to communicate via Wi-Fi.
(e) Establishing a Wi-Fi network is less expensive compared to establishing a 10/100 Ethernet (wired) network.

35) Which of the following statements is/are true with Fire-Wire interface?

(a) Fire-Wire requires a connector on your computer, to transfer information from one PC to another device.
(b) Fire-Wire contains its own processor and a memory to improve its performance.
(c) Fire-Wire was created by a joint effort from Apple, Sony and Panasonic that was standardized in 1995 as IEEE1394.
(d) Fire-Wire interface is extremely fast and hence popular in connecting audio and video multimedia devices to the PC.
(e) Fire-Wire is also commonly known as iLink on Sony devices.
36) Which of the following statement(s) is/are true with respect to CRT and Flat-Panel LCD monitors?

(a) A CRT monitor tube is a glass vacuum tube with one-end having an electron gun and the other a display surface coated with phosphors.
(b) CRT monitor tube uses four electron beams to generate the red, green, UV and blue light.
(c) Electron beams are used to determine the refresh rates of the CRT monitor screen.
(d) Early LCD Flat-Panels worked in a three-colour RGB mode.
(e) A backlight mechanism is introduced to illuminate what is displayed on LCD screen.

37) Which of the following is/are not component(s) of a motherboard?

(a) BIOS ROM (b) Microprocessor (c) Hard Disk
(d) PCI/ISA/AGP bus slots (e) CD ROM Drive

38) Which of the following expansion card(s) contain(s) its onboard processor and memory to improve the performance?

(a) Sound card (b) Fire-wire card (c) Graphics accelerator card
(d) TV and video capture card (e) Network card

39) Which of the following factor(s) can be considered as advantage(s) in a networked computing system?

(a) Enforceability of Standards (b) Higher Reliability (c) Data Redundancy
(d) Resource share ability (e) Remote Computability

40) Which of the following transmission media can be considered as unguided data transmission media?

(a) Twisted Pair Copper (b) Line of sight Microwave (c) Satellite
(d) Optical fiber (e) Infrared
41) Which of the following statement(s) is/are true when replacing a motherboard?

(a) The motherboard has to be compatible with the speakers connected to the sound card.
(b) The CPU has to be compatible with the motherboard type.
(c) The motherboard has to be compatible with the monitor.
(d) The power supply has to be of the same form factor as the motherboard.
(e) The motherboard has to be compatible with the hard disk type.

42) Which of the following network(s) configurations would be completely affected in case of a failure of any node?

(a) Star (b) Ring (c) Tree
(d) Mesh (e) Bus

43) Which of the following device(s) is/are used to separate voice and data into relevant end devices within a home telephone network?

(a) Hub (b) Router (c) Splitter
(d) Gateway (e) Modem

44) Which of the following software is/are not a utility type of software?

(a) Scan Disk (b) Data Compression (c) Organizer Notes
(d) Anti-Virus (e) Backup Software

45) Which of the following option(s) in a software installation process allow(s) users to select the components they wish to install?

(a) Custom (b) Typical (c) Network
(d) Standard (e) Full

46) Which of the following software is/are focused on collaboration and coordination type of development?

(a) Content Management System
(b) Human-based genetic Algorithm
(c) Whiteboarding
(d) Management Information System
(e) Enterprise Application Software
47) Which of the following Operating System(s) is/are used in a typical embedded system?

(a) LiteOS  (b) Matchbox  (c) Symbian
(d) Windows NT  (e) Android

48) Which of the following system component(s) might require upgrading, for the computer to support a high-end realistic 3D game?

(a) Keyboard  (b) Operating System  (c) Main Memory
(d) DVD-ROM  (e) VGA Card

49) Which of the following statement(s) is/are correct about POST?

(a) The main devices tested by the POST are the CPU, motherboard support circuits, ROM, RAM, video graphic adapter and the Hard disk drive.
(b) POST program is loaded just after locating the first boot sector to start up the computer system.
(c) POST program indicates errors in the form of audio codes, on screen messages or check point codes.
(d) POST program protects the bootstrapped code from being interrupted by faulty hardware.
(e) The BIOS program handles the main duties of POST.

50) Which of the following components is/are needed to be taken into considerations when upgrading the processor on a computer system?

(a) Motherboard  (b) Main Memory  (c) Power Supply
(d) VGA Card  (e) Hard Disk

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