M. Sc. (Electronics) (Fourth Semester)

EXAMINATION, July, 2022

(Elective Course)

EMBEDDED SYSTEM

Paper Code			
ELC	4	0	4	(D)

Questions Booklet
Series

D

Time : 1:30 Hours]   [*Maximum Marks : 100*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।

2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। सभी प्रश्नों के अंक समान हैं।

3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page)

(शेष निर्देश अन्तिम पृष्ठ पर)

(Only for Rough Work)

1. Which of the following is the biggest challenge in the cache memo design ?

(A) Memory access

(B) Delay

(C) Coherency

(D) Size

2. Which one of the following offers CPUs as integrated memory or peripheral interfaces ?

(A) Memory system

(B) Embedded system

(C) Microprocessor

(D) Microcontroller

3. Which of the following statements is true ?

(A) Any occurrence that causes the program counter to change non-sequentially is considered a change of flow-of-control.

(B) The release time is the time at which an instance of a scheduled task is ready to run, and is generally associated with an interrupt.

(C) Both (A) and (B)

(D) None of the above

4. Which is the standard C compiler used for the UNIX systems ?

(A) compiler

(B) simulator

(C) cc

(D) sc

5. Which of the following software represents machine based code in target base code and verifies errors in code ?

(A) Assembler

(B) Debugger

(C) Compiler

(D) Both (A) and (B)

6. Which of the following are debugging tools ?

(A) ISP

(B) ICSP

(C) JTAG

(D) All of the above

7. Which of these can lead to a reduction of the loop overhead thus leading to an increase in the speed ?

(A) Loop permutation

(B) Loop tiling

(C) Loop unrolling

(D) Loop fusion

8. How do we compute the power consumed by a cache ?

(A) First power model

(B) CACTI

(C) Lee power model

(D) Third power model

9. What does ICE stand for ?

(A) in-code EPROM

(B) in-circuit EPROM

(C) in-circuit emulation

(D) in-code emulation

10. Which are the serial ports of the IBM PC ?

(A) COM1

(B) COM3

(C) COM1 and COM2

(D) COM4 and COM1

11. FireWire technology was originally developed by ....

(A) Google

(B) Microsoft

(C) Apple

(D) None of the above

12. Which of the following hardware is used as alternative for an embedded system ?

(A) ICE

(B) Emulator

(C) Counters

(D) Memory

13. DMA stands for ....

(A) Direction Media Access

(B) Directed Memory Access

(C) Direct Medium Access

(D) None of the above

14. Atmega 328 controller is designed with how many bits ?

(A) 4 bits

(B) 8 bits

(C) 16 bits

(D) 32 bits

15. Which of the following are serial type communication interfaces for microprocessor ?

(A) RS-232

(B) SPI

(C) RS-422

(D) All of the above

16. Real time systems can be classified into :

   (A) Soft

   (B) Hard

   (C) Firm

   (D) All of the above

17. In which scheduling certain amount of CPU time is allocated to each process ?

   (A) Earliest deadline first scheduling

   (B) Proportional share scheduling

   (C) Equal share scheduling

   (D) None of the above

18. Time duration required for scheduling dispatcher to stop one process and start another is known as ....

   (A) process latency

   (B) interrupt latency

   (C) dispatch latency

   (D) execution latency

19. The problem of priority inversion can be solved by ....

   (A) priority inversion protocol

   (B) priority inheritance protocol

   (C) Both priority inheritance and inversion protocol

   (D) None of the above

20. Which one of the following is a real time operating system ?

   (A) RTLinux

   (B) VxWorks

   (C) Windows CE

   (D) All of the above

21. Which of these statements would replace all the occurrences of an identifier with a string ?

   (A) # include

   (B) # define identifier string

   (C) # define MACRO

   (D) # ifdef

22. Which of these designs considers both the software and hardware during the embedded design ?

   (A) Peripheral Design

   (B) Software/Hardware Design

   (C) Platform-Based Codesign

   (D) Memory Design

23. The first power model was proposed by :

   (A) Jacome

   (B) Tiwari

   (C) Russell

   (D) Jacome and Russell

24. A hard real-time system is one in which ....

(A) Missing more than a few may lead to complete and catastrophic system failure.

(B) Performance is degraded but not destroyed by failure to meet response-time constraints.

(C) Failure to meet a single deadline may lead to complete and catastrophic system failure.

(D) None of the above

25. Which of these models would communicate between various components ?

(A) Fine-grained model

(B) Coarse-grained model

(C) Transaction-level model

(D) Circuit-level model

26. Which of these is possible for locating various errors while specifying the future bus protocol ?

(A) BDD

(B) FOL

(C) EMC

(D) HOL

27. Which of these levels would simulate the algorithms used within an embedded system ?

(A) Gate Level

(B) Algorithmic Level

(C) Switch Level

(D) Circuit Level

28. Which of these would describe the connections present between the local component and the entity port ?

(A) Many-to-one map

(B) One-to-one map

(C) One-to-many maps

(D) Port map

29. How many wait statement types are available in a VHDL design ?

(A) 6

(B) 3

(C) 5

(D) 4

30. Discipline(s) that impact on real-time systems engineering is/are ....

(A) Operations Research

(B) Control Theory

(C) Both (A) and (B)

(D) None of the above

31. The Index set L would denote what ?

(A) Task Graph Node Type

(B) Task Graph Node

(C) Hardware Components

(D) Processor

32. Which signal do we use for differentiating access from any standard memory cycle ?

(A) RESET

(B) HALT

(C) IORQ

(D) MREQ

33. What are the two major sections in a coprocessor ?

(A) Integer unit and control unit

(B) Floating point unit and coprocessor unit

(C) Coprocessor unit and numeric control unit

(D) Control unit and numeric control unit

34. Which design allows the reuse of the software and the hardware components ?

(A) Platform-based design

(B) Peripheral design

(C) Input design

(D) Memory design

35. Many real-time systems utilize time-stamping and global clocks for ....

(A) Synchronization

(B) Data marking

(C) Task initiation

(D) All of the above

36. What does API stand for ?

(A) Address Programming Interface

(B) Accessing Peripheral through the Interface

(C) Application Programming Interface

(D) None of the above

37. What does FRIDGE stand for ?

(A) floating-point programming decoding

(B) fixed-point programming decoding

(C) the fixed-point programming design environment

(D) the floating-point programming design environment

38. Which of the following are hardware components of an embedded system ?

(A) Computer processor

(B) Device peripherals

(C) Computer memory

(D) All of the above

39. Which of the following is not the hardware component of an embedded system ?

(A) Linker

(B) Compiler

(C) Loader

(D) All of the above

40. The CISC is based on which of the following principles ?

(A) There are multiple instructions and addressing modes

(B) Complexity handled by the compiler and software

(C) Highly pipelined design

(D) Instructions executed directly by hardware

41. Which of the following designed system factors are minimized for an embedded application ?

(A) Size

(B) Cost

(C) Performance

(D) Both (A) and (B)

42. Which of the following is an example of RTOS ?

(A) Inertial measurement system for an aircraft

(B) System that controls all aspects of the bottling aspects of the bottling of jars of pasta sauce

(C) System used to control a set of traffic lights at a four-way traffic intersection

(D) All of the above

43. For real time operating systems, interrupt latency should be _____.

(A) zero

(B) minimal

(C) maximum

(D) dependent on the scheduling

44. Which of the following are the class of performance and functional based requirement embedded systems ?

(A) Real-time

(B) Stand alone

(C) Mobile

(D) All of the above

45. What supports multitasking in 80386 ?

(A) External paging memory management unit

(B) Read mode

(C) Paging and segmentation

(D) On-chip paging memory management

46. Which is a top-down method of analyzing risks ?

   (A) Hazards

   (B) FMEA

   (C) Damages

   (D) FTA

47. Which models communicate between the components ?

   (A) Fine-grained modeling

   (B) Transaction level modeling

   (C) Circuit-level model

   (D) Coarse-grained modeling

48. Watchdog timers are used to ensure that ....

   (A) Certain devices are serviced at regular intervals

   (B) CPU continues to function

   (C) Both (A) and (B)

   (D) Task initiation

49. What allows the data protection in the interrupt mechanism ?

   (A) TRAP

   (B) Same mode

   (C) SWI

   (D) Different mode

50. Which of the following unit protects the memory ?

   (A) Peripheral unit

   (B) Memory management unit

   (C) Execution unit

   (D) Bus interface unit

51. Which of the following offers external chips for memory and peripheral interface circuits ?

   (A) Embedded system

   (B) Peripheral system

   (C) Microcontroller

   (D) Microprocessor

52. Which buffering mechanism is common to the SPOX operating system ?

   (A) Single buffer

   (B) Buffer exchange

   (C) Directional buffer

   (D) Linear buffer

53. Which of the following is a part of RTOS kernel ?

   (A) Memory

   (B) Input

   (C) Register

   (D) ISR

54. Which interrupts generate fast interrupt exception ?

   (A) External interrupt

   (B) Internal interrupt

   (C) Hardware interrupt

   (D) Software interrupt

55. Which of the following is a common connector ?

   (A) I2C

   (B) UART

   (C) DB-25

   (D) SPI

56. Which of the following are the software environment used for an embedded system ?

   (A) Lab view

   (B) Proteus

   (C) MATLAB

   (D) All of the above

57. A .... converts the digital data fed by the processor to analog data.

   (A) A-D converter

   (B) Sensor

   (C) D-A converter

   (D) None of the above

58. Which of the following is a traditional method for emulating the processor ?

   (A) CPU simulator

   (B) ICE

   (C) SDS

   (D) None of the above

59. Which of the following task swapping method is a better choice in the embedded systems design ?

   (A) pre-emptive

   (B) cooperative multitasking

   (C) RMS

   (D) time slice

60. Which of following regarding RTOS is correct/not misconception ?

   (A) The study of real-time systems is mostly about scheduling theory.

   (B) Rate-monotonic analysis has solved the real time problem.

   (C) There are no universal, widely accepted methodologies for real-time systems specification and design.

   (D) None of the above

(Only for Rough Work)

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 Ⓐ ● Ⓒ Ⓓ
Q. 2 Ⓐ Ⓑ ● Ⓓ
Q. 3 Ⓐ ● Ⓒ Ⓓ

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.

6. All answers are to be given on OMR Answer sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.

7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.

8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.

9. There will be no negative marking.

10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.

11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.

12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is ny discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर— A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से एक सबसे सही अथवा सबसे उपयुक्त उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 Ⓐ ● Ⓒ Ⓓ
प्रश्न 2 Ⓐ Ⓑ ● Ⓓ
प्रश्न 3 Ⓐ ● Ⓒ Ⓓ

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।

6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।

7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।

8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।

9. निगेटिव मार्किंग नहीं है।

10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।

12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।