

Important Notes:

- This paper contains **FIVE** questions in **THREE** pages.
- Attempt **ALL** questions.
- Enhance your answers with proper sketches whenever applicable.

Total Marks: 100

Q.1 [20 Marks] Multiple Choice Questions (MCQ):

2 Marks each

1. Moore's law states that the number of transistors in a chip will approximately double every
 - a. 1 month.
 - b. 24 weeks.
 - c. 2 years.
 - d. None of the above.
2. The default Vref of ATmega328 ADC used in Arduino Uno is
 - a. 1.1 V.
 - b. 3.3 V.
 - c. 5 V.
 - d. None of the above.
3. The bandwidth of ATmega328 is
 - a. 8-bit.
 - b. 32K Byte.
 - c. 1023 quantization levels.
 - d. 5 V.
4. STS instruction is used with addressing mode.
 - a. Direct.
 - b. Indirect.
 - c. Immediate.
 - d. None of the above.
5. registers are used to control/configure of MCU or peripherals.
 - a. GPR.
 - b. SFR.
 - c. Data pointer registers.
 - d. None of the above.
6. The first packet in I2C transmitted data is called
 - a. Address packet.
 - b. Error check packet.
 - c. Idle packet.
 - d. LSB packet.



Choose True or False and Provide a valid reason if false.

4 Marks each

7. For ADC of a microcontroller, the terms resolution and accuracy have the same meaning.
a. True. ()
b. False. ()
8. Both I2C and SPI can be configured in full-duplex transmission mode.
a. True. ()
b. False. ()

Q.2 [20 Marks] Explain the purpose of the following:

- Arduino function `pinMode(INPUT_PULLUP)`.
- Signal Conditioning Circuit.
- The SS/CS line of SPI transmission.
- H-Bridge.

Q.3 [12 Marks] Write ATmega328 assembly instruction(s) for the following tasks:

- Read state of a push button connected to PB0.
- Enabling global interrupt.
- Add the content of the first two register of SRAM.

Q.4 [24 Marks] For ATmega328 explain the following in detail:

- Explain in detail the process of generating PWM signals using timers.
- Write assembly instructions to generate 40% duty PWM signal with Timer2.
- How successive approximation ADC works?
- Assuming the ADC resolution is 4-bits, show the steps of converting 3V input into digital number, if reference voltage is 5V.

Q.5 [24 Marks] Carry out the following tasks:

- Briefly explain UART transmission.
- Referring to figure 1 below, draw UART signal representing the first letter of your name and configured as follows:
 - 8 data bits.
 - Even parity.
 - 2 stop bit.
- If ATmega328 is running at 16 MHz, write assembly instructions to set transmission speed at 2400 bps.

END OF QUESTIONS

أسئلة الامتحان النهائي لمادة : أنظمة حاسب دقيقة
رمز المادة : CE223 التاريخ : 2019 / 9 / 24

القسم : الإتصالات
لطلبة الفصل : الرابع



الزمن : ساعتان
المجموعة :

إسم الأستاذ: عبدالباسط عاشور
رقم القيد :

Character	Decimal	Octal	Hexadecimal	Character	Decimal	Octal	Hexadecimal
A	065	101	41	N	078	116	4E
B	066	102	42	O	079	117	4F
C	067	103	43	P	080	120	50
D	068	104	44	Q	081	121	51
E	069	105	45	R	082	122	52
F	070	106	46	S	083	123	53
G	071	107	47	T	084	124	54
H	072	110	48	U	085	125	55
I	073	111	49	V	086	126	56
J	074	112	4A	W	087	127	57
K	075	113	4B	X	088	130	58
L	076	114	4C	Y	089	131	59
M	077	115	4D	Z	090	132	5A

Fig. (1) ASCII Table.