ARM Practice Exam Problems

Part A: Answer the following questions by marking the best answer in the given choices:

1. The ARM processor used in this course has … architecture.
   a. Harvard
   b. Von Neumann
   c. Computer

2. The bit word address in bit-banding with bit band based address of 0x20000000 and byte offset of 0x300 and bit number of 2 is …
   a. 0x20006008
   b. 0x22006008
   c. 0x20003004

3. To boot from the embedded SRAM, boot bins must be …
   a. BOOT0=1 and BOOT1=0
   b. Both 0
   c. Both 1

4. To assign an input/output pin as input pin, its corresponding … bits must be cleared.
   a. CNFx[0:1]
   b. MODE[0:1]
   c. PxODR

5. To ensure that a desired change is not interrupted resulting in partial set/reset of GPIOs, … is used.
   a. Faster clock
   b. Interrupt disable
   c. Atomic operation

6. In Open-Drain configuration of a GPIO pin, the output is … when writing "1" to the corresponding bit in the Output register.
   a. 1
   b. 0
   c. Hi-Z

7. When a GPIO pin is programmed as a push-pull output pin, reading the corresponding bit in the Input register gives …
   a. The value of output data
   b. Error
   c. Hi-Z

8. Port B Output Data Register is called …
   a. GPIO_ODRB
   b. GPIO_ODR_B
   c. GPIOB_ODR

9. After a system reset, the HSI oscillator is selected as system clock.
   a. HSI
   b. HSE
   c. PLL

10. In low-power modes, a … clock source is preferred.
    a. High speed

    b. Low speed

    c. Real-time

11. Leaving watchdog timer without reset leads to …

    a. Timer overflow flag

    b. Timer underflow flag

    c. System reset

12. Highest priority interrupt in the ARM processor is the … interrupt.

    a. Reset

    b. Non-maskable

    c. Memory management

13. The direction bit (DIR from TIM2_CR1 register) cannot be changed in … counting mode.

    a. Up

    b. Down

    c. Up-Down

14. Setting GPIO pin PC8 causes the … LED to light up on the STM32 Value Line Discovery kit.

    a. Green

    b. Blue

    c. Red

15. The User button on the STM32 Value Line Discovery kit is connected to GPIO pin …

    a. PC0

    b. PB0

    c. PA0

Part B: Mark the following statements as either True (T) or False (F):

16. To allow a GPIO to work as input/output, it must be configured as an open-drain output mode.

17. It is not possible to disable the output buffer of a GPIO.

18. A +5V supply is an acceptable V_{DD} supply voltage of the ARM processor.

19. Analog supply voltage V_{DDA} can be different from digital supply V_{DD}.

20. Power on reset and power down reset voltages can be programmed to be the same.

21. Programmable voltage detector hysteresis can be programmed through PLS[0:2].

22. After enabling the PLL clock multiplier, it is not possible to reprogram the multiplication factor.

23. SysTick interrupt priority can be reprogrammed.

24. All interrupt sources can be masked by software.

25. It is possible to activate an external interrupt based on both rising and falling triggers.

26. A general purpose timer can be programmed to work in up/down mode.

27. TIM2 and TIM5 are programmed and work independently.

28. It is possible to automatically generate random noise output from the DAC module.

29. The DAC module can be programmed as a 10-bit DAC.

30. It is possible to trigger conversion in DAC module by software.

Part C: Answer the following questions:

31. Draw a timing diagram of TIM2 in down-counting mode starting from TIM2_CNT value of 0x0001 and given that TIM2_ARR is 0x0003.

32. Draw a timing diagram of TIM2 in up-counting mode starting from TIM2_CNT value of 0x0001 and given that the starting value of TIM2_ARR was 0x0003 and that it was rewritten to be 0x0004 when TIM2_CNT became 0x0002 and given that ARPE=0.

33. Consider the simple microcontroller-controlled dialysate heater shown below. Design an ARM project that would enable the ON/OFF control of the heater to adjust the temperature to within a given predefined range T_{min} and T_{max}. The desired control is such that the heater is turned on whenever the temperature drops below T_{min} and turned off when the temperature is above T_{max}. Assume that the ADC used is of 8-bit FLASH type connected to GPIO port PA (i.e., digital input reading corresponds to the temperature value whenever it is read). Assume also that the control of the heater is such that when the microcontroller pin PB0 is 1 the heater is ON and when it is 0 the heater is OFF.