Assignment 10

The due date for submitting this assignment is 23:59 IST.

Due on 2021-03-31, 23:59 IST.

As per our records you have not submitted this assignment.

Instructions:

1. Answer all questions; all questions carry equal marks.
2. All questions have fixed numerical values.
3. Each question has multiple correct answers; the correct answers are marked within the correct answer choice.
4. Carefully read the units in numerical problems, to match with the units given in the options of SIQs, and the units in which answers have to be entered (in the shaded boxes of SIQs). In all the above types of questions, only the numerical values have to be entered.

NOTE: You can see the correct answers after the last date of submission. Marks obtained in this quiz will be counted towards your final score. You can take the quiz and submit it any number of times, and the latest submitted answers will be taken as your final submission.

(a) ARMOR application was pulling laser light for detection and viewing. By decreasing which one of the following parameters of the pulsed light, can the spatial resolution of detection be improved?

- Pulse power
- Average power
- Pulse width
- Repetition rate

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: Pulse width

(b) State whether the following statement is TRUE or FALSE:

Pulsed lasers are used in laser surgery because they can create a highly localized and larger lesion with minimal collateral damage to other tissue parts because of high peak power and low average power of this laser.

TRUE
FALSE

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: TRUE

(c) A mechanical chopper is used to modulate a CW laser with an output power of 8 mW. If the modulated laser output contains a tree of rectangular pulses of 30 μs pulse duration with 30 Hz (cycle), then the energy per pulse obtained at the output of the modulator is ___ J.

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: 0.00036

(d) In Q. 2 above, the energy conversion efficiency of the modulator in producing pulsed output is ___ %.

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: 0.00000

(e) Which one of the following statements regarding the 'Q-switching' and ' cavity dumping' methods of pulsing lasers is incorrect?

- Both methods operate on the basis of resonator laser mode locking.
- Both methods involve storing the laser energy in the resonator and releasing the laser energy in the resonator.
- Switching the laser resonator's feedback is the basis for the 'cavity dumping' method.
- Switching the laser resonator's feedback is the basis for the 'Q-switching' method.

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: Both methods involve storing the laser energy in the resonator

(f) In a particular laser, operating at a pump power above the threshold and going on CW output power, the resonator mirrors (which provide feedback) are suddenly removed. Which one of the following would occur momentarily after removal?

- Output power increases and population inversion decreases.
- Output power decreases and population inversion increases.
- Output power increases and population inversion increases.
- Output power decreases and population inversion decreases.

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: Output power decreases and population inversion decreases.

(g) The rate of Q-switching by the modulator in a Q-switched laser primarily determines which one of the following parameters of the output laser light?

- Pulse width
- Pulse repetition rate
- Energy per pulse
- Peak power of the pulse

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: Pulse repetition rate

(h) A multi-longitudinal mode gas laser of cavity length 15 cm is oscillating with 8 longitudinal modes. The ratio of the peak output powers, when the longitudinal modes are (i) in the phase-locked condition, and (ii) in the random phase condition, is _____. Assume that all longitudinal modes have equal amplitudes.

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: 0.00000

(i) In Q. 6 above, for the case of phase-locked condition, the pulse width of the output pulse is ___ ns.

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: 0.00000

(j) State whether the following statement is TRUE or FALSE:

In a passive mode locked laser using a saturable absorber, the relaxation time of the saturable absorber must be greater than or equal to the cavity round-trip time (L/C).

TRUE
FALSE

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: TRUE

(k) In Q. 9 above, for the case of phase-locked condition, the pulse width of the output pulse is ___ ns.

Answer: No, the answer is incorrect.
Score: 0
Accepted Answers: 0.00000