

Course outline

How does an NPTEL online course work?

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Week 11

Some Common Lasers

Fiber Lasers

Semiconductor Lasers

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Assignment 11

The due date for submitting this assignment has passed.

Due on 2021-04-07, 23:59 IST.

As per our records you have not submitted this assignment.

Instructions:

1. Answer all questions; all questions carry equal mark.
2. All symbols have their usual meanings.
3. Only one of the options is correct.
4. Take care of the units in numerical problems, to match with the units given in the options (of MCQs), and the units in which answers have to be entered (in fill in the blank type of questions).
5. In the fill in the blank type 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.

- 1) Based on the consideration of *quantum defect*, which one of the following laser systems is most efficient? **1 point**
- Er-doped fiber laser pumped at 980 nm and lasing at 1550 nm
 - Nd-doped fiber laser pumped at 804 nm and lasing at 1064 nm
 - Yb-doped fiber laser pumped at 975 nm and lasing at 1070 nm
 - Er-doped fiber laser pumped at 1480 nm and lasing at 1600 nm

No, the answer is incorrect.
Score: 0

Accepted Answers:
Er-doped fiber laser pumped at 1480 nm and lasing at 1600 nm

- 2) State whether the following statement is TRUE or FALSE: **1 point**

In a diode-pumped Nd:YAG laser, the dichroic mirrors are designed such that there is high transmission at the lasing wavelength and high reflection at the pump wavelength.

- TRUE
- FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
FALSE

- 3) Which of the following is *not* an advantage in using *X-fold cavity* for DPSS Nd:YVO4 laser? **1 point**

- It allows for effectively increasing the length of the cavity while maintaining the compactness of the laser-system.
- It enables the placement of additional optical components along the beam-path for different applications.
- Multiple output beams of different wavelengths can be obtained by suitable arrangement.
- The pump power conversion efficiency is enhanced as compared to a typical 2-mirror cavity laser.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The pump power conversion efficiency is enhanced as compared to a typical 2-mirror cavity laser.

- 4) Which one of the following frequency-selective filters is *least suitable* for use in a high-resolution frequency tunable laser? **1 point**

- External-cavity grating
- Prism-mirror combination
- Acousto-optic tunable filter
- Electro-optic tunable filter

No, the answer is incorrect.
Score: 0

Accepted Answers:
Prism-mirror combination

- 5) Which one of the following is *not an* advantage of high-power fiber laser over DPSS laser? **1 point**

- Higher wall plug efficiency
- Low maintenance requirement
- No cooling requirement
- Higher output power

No, the answer is incorrect.
Score: 0

Accepted Answers:
No cooling requirement

- 6) An Er-doped fiber laser is to be designed at a lasing wavelength of 1550 nm. Given that the effective refractive index of the guided mode in the fiber at 1550 nm wavelength is 1.5. The period of the fiber Bragg-grating to be used as feedback mirrors is ___ μm .

(Write your answer up to 3 decimal places)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.506,0.526

1 point

- 7) State whether the following statement is TRUE or FALSE: **1 point**

In double-clad fiber laser, the high-power pump is confined to the inner cladding and the lasing beam is confined to the inner core to minimize degradation of the laser output due to nonlinear optical effects.

- TRUE
- FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
TRUE

- 8) Which one of the following features is *not* an advantage of semiconductor lasers over fiber lasers? **1 point**

- Compactness of the laser system
- Ease of optoelectronic integration
- High quality output beam
- Feasibility of direct modulation

No, the answer is incorrect.
Score: 0

Accepted Answers:
High quality output beam

- 9) Which one of the following is not a feature of the *double heterostructure* in a semiconductor laser (as compared to that of a homojunction device)? **1 point**

- Relatively lower threshold current
- Lower absorption losses at the laser wavelength
- Stronger confinement of carriers in the active region
- Pulsed operation of the laser

No, the answer is incorrect.
Score: 0

Accepted Answers:
Pulsed operation of the laser

- 10) State whether the following statement is TRUE or FALSE: **1 point**

A double heterostructure is formed when a semiconductor medium of lower refractive index is sandwiched between two semiconductor mediums of higher refractive index.

- TRUE
- FALSE

No, the answer is incorrect.
Score: 0

Accepted Answers:
FALSE