Ref No.: Ex/PG/IlluTD/T/131A/2024

M.TECH ILLUMINATION TECH. AND DESIGN SECOND YEAR FIRST SEMESTER – 2024

SUBJECT: - LASER LIGHTING ANIMATION & CREATIVE LIGHTING

Time: Three hours

Full Marks: 100
(50 marks for this part)

Use Separate Answer scripts for each part.

PART- I

1. Answer any four questions: 3 x 4=12

a) Differentiate between spontaneous and stimulated emissions?

b) Draw and label different types of resonators used in a Laser systems.

c) Write few general Laser safety rules.

d) Explain different pumping mechanism.

e) What do you mean by Laser resonant cavity and its application?

f) What do you mean by Q-switching in a laser?

2. Answer any three questions: 6 x 3=18

i. Obtain the relations between Einstein's A coefficient and spontaneous lifetime.

ii. Explain with sufficient diagrams Ruby laser.

iii. Describe different Class of Lasers based on their hazards.

iv. Draw a labeled schematic diagram of Laser projector.

3. Answer any two questions: 10 x 2=20

i. Derive the expression for critical or minimum pumping rate required to achieve population inversion in three level laser system.

ii. Explain with derivations why two-level laser system is not possible.

iii. Explain different sources of line broadening in details.

[Turn over

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PART- II

Answer any ***five questions***

1. With the help of diagram briefly explain the lighting position and lighting distribution of Proscenium stage. 10

2. Briefly describe some creative lighting effects. 10

3. What is Glitter? What is SAD? Briefly explain about the Dichroic Filter. 2+3+5 =10

4. Write down some steps & explain for plotting the lighting design of a stage lighting. 10

5. Discuss on some functions of creative lighting. Briefly explain about the Fresnel Spotlight. 5 + 5 =10

6. Briefly explain some accessories of conventional creative lighting luminaires. 10

7. Consider, a LASER show has been carried out in an entertaining field. The wavelengths used for the show 450 nm, 550 nm & 650 nm. Find the attenuation coefficient of the LASER wavelengths on that environment using KIM & KRUSE Model. Consider the visibility range $V \geq 50$ km & $V \leq 5$ km. Also, Find out the percentage of deviation of attenuation coefficient between the two models of the visibilities for different considered wavelengths. 10

8. Write short notes on any two: 5x2=10

(i) Down light & Up light

(ii) Plastic Media

(iii) Silhouettes & Grazing