Reg. No.



(A constituent unit of MAHE, Manipal)

II SEMESTER M.TECH (ENERGY SYSTEMS & MANAGEMENT)

MAKE UP EXAMINATIONS, JUNE 2018

SUBJECT: SOLID STATE LIGHTING AND CONTROLS [ELE 5240]

REVISED CREDIT SYSTEM

| Time: 3 Hours | | Date: 19 June 2018 | Max. Mar | rks: 50 |
|-----------------------------|--|---|------------|---------|
| Instructions to Candidates: | | | | |
| | ✤ Answer ALL the questions. | | | |
| | Missing data may be suitably assumed. | | | |
| | | | | |
| 1A | Derive the expression for i escaped light power depend | ntensity emission pattern of LED and hence sho s on the refractive index of the material used. | w that the | (05) |
| 1B | Explain briefly the life cycle | of a photon | | (05) |
| 2A | Explain the techniques for generation of white light with LEDs with their adva disadvantages. | | ntages and | (06) |
| 2B | Write a short note on binnin | g of LEDs | | (04) |
| 3A | What is the significance of following methods of curren | current regulation in LEDs. Explain with neat dia t regulation | igrams the | |
| | (a) Resistor (b) LM317 | (c) MOSFET | | (06) |
| 3B | Explain phase control dimme | er with neat diagram | | (04) |
| 4 A | What is the need for feed forward and flux feedback so | back control of LEDs? Explain combined temper cheme to achieve color stability. | ature feed | (04) |
| 4B | Explain the various configur | ation schemes used for connecting multiple LEDs. | | (06) |
| 5A | Design a suitable driver topo for the following specificatio | ology and give the circuit schematic for a LED light | ing system | |
| | Input voltage – (22-26)V LED string voltage range – (4 LED drive current – 350mA Ripple current - 10 % Desired efficiency – 90% LED string dynamic impedan Change in LED drive current Switching frequency – 40kH | 40 – 70)V nce – 18ohms : – 15% z | | (06) |
| 5B | A fixture with 5 LEDs conner with proper heat management | ected in parallel is to be designed for general lighti | ng scheme | |

with proper heat management technique. Determine the thermal resistance specification from heat sink to air to ensure maximum ambient and junction temperature of 55°C and 145°C. Given LED data Vf = 3.25V, If = 350mA, Rth(Tj-sp) = 8°C/W and Rth(sp-hs) = 1°C/W (04)