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R-11 / R-13

Code: 1G311

B.Tech. I Year Supplementary Examinations Nov/Dec 2019

Electronic Devices and Circuits

(Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

- 1. a) What do mean by drift current? What is the total current density due to holes and electrons in intrinsic semiconductor? 8M
b) What are the characteristics of metals, insulators and semiconductors? 6M
- 2. a) What is Zener breakdown and avalanche breakdown? 7M
b) What are the applications of semiconductor diode? 7M
- 3. a) What is a rectifier? 2M
b) Classify the different rectifiers? Explain each of them with necessary diagrams 10M
- 4. Draw a circuit to determine the input and output characteristics of common emitter configuration and determine the approximate operating point on the characteristics for faithful amplification. 14M
- 5. With necessary arrangements derive a voltage divider circuit and explain the operation. 14M
- 6. a) Distinguish between enhancement mode and depletion mode MOSFETS 7M
b) Draw the static characteristics of a MOSFET and explain. 7M
- 7. Obtain the h parameters of a common collector transistor amplifier and derive the approximate equations 14M
- 8. a) What is meant by latching? 4M
b) What are the applications of opto-isolators? Explain any one of them 10M

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R-11 / R-13

Code: 1GC12

B.Tech. I Year Supplementary Examinations Nov/Dec 2019

Engineering Physics

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) Define interference and explain conditions of constructive and destructive interference 7M
b) Describe the theory of Newton's rings experiment 7M
2. a) Define space lattice, basis and unit cell 7M
b) Describe seven crystal systems with neat diagrams 7M
3. a) Derive Schrödinger's time independent wave equation 7M
b) describe importance of Schrödinger's wave equation 7M
4. a) Compare direct and indirect band gap semiconductors 7M
b) Outline the working of LCD 7M
5. Explain ionic, electronic and orientation polarizations 14M
6. a) Define superconductivity and write general properties 7M
b) Explain Meissner's effect in superconductors 7M
7. a) Explain the principle of working of optical fiber 7M
b) Write a note on optical fiber communication system 7M
8. a) Elaborate CNT's construction and properties 7M
b) summarize the CNT's in technology 7M

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R-11 / R-13

Code: 1GC14

B.Tech. I Year Supplementary Examinations Nov/Dec 2019

Mathematics-I

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

1. a) Solve $(x+1)\frac{dy}{dx} - y = e^{3x}(x+1)^2$. 7M
 b) The rate at which bacteria multiply is proportional to the instantaneous number present. If the original number doubles in 2 hours, in how many hours will it be triple? 7M

2. Solve $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = (1 - e^x)^2$ 14M

3. Prove that if $0 < a < b < 1$, $\frac{b-a}{1+b^2} < \tan^{-1} b - \tan^{-1} a < \frac{b-a}{1+a^2}$. Hence show that $\frac{f}{4} + \frac{3}{25} < \tan^{-1} \frac{4}{3} < \frac{f}{4} + \frac{1}{6}$. 14M

4. a) Trace the curve $y^2(2a - x) = x^3$ 7M
 b) Trace the curve $x^3 + y^3 = 3axy$ 7M

5. Evaluate $\iint xy(x+y) dx dy$ over the area between $y=x^2$ and $y=x$. 14M

6. a) Find the Laplace transform of $\left(\sqrt{t} - \frac{1}{\sqrt{t}}\right)^3$ 7M
 b) Find the Laplace transform of $t^2 \sin at$ 7M

7. Solve $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - 3y = \sin t$, $y = \frac{dy}{dt} = 0$ when $t = 0$. 14M

8. Find $\text{div } \bar{F}$ and $\text{Curl } \bar{F}$ when $\bar{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$. 14M
