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MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

V SEM B.TECH. (BME) DEGREE END SEMESTER EXAMINATIONS, DECEMBER 2018 SUBJECT: MATERIALS SCIENCE FOR BIOMEDICAL ENGINEERING (BME 4013) (RECISED CREDIT SYSTEM) Monday, 26th November 2018: 2 PM to 5 PM

TIME: 3 HOURS

MAX. MARKS: 50

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Instructions to Candidates: 1. Answer ALL questions. 2. Draw labeled diagram wherever necessary

- 1. (a) Relate the temperature dependence of resistivity for a pure metal and a twometal alloy. 7
 - (b) Explain energy band structure in metals.
- 2. (a) Explain in detail the Drude's model of conductivity for intrinsic and extrinsic 5 semiconductors
 - (b) Deduce the polarizations present in NaCl (sodium chloride), considering NaCl is an ionic dielectric material without any permanent dipoles. 5
- 3. (a) Interpret the given graph with an explanation on the characterization technique 5 and compare the thermal stability of the polymer P1 and P2.



	(b)	What is luminescence? Explain down conversion and up conversion luminescence.	5
4.	(a)	Explain in detail the working principle of Ruby LASER	5
	(b)	Explain the effect of magnetic field and electric current on superconductivity.	5
5.	(a)	"BaTiO ₃ is a ferroelectric and pyroelectric material with a critical temperature of 130° C". Justify the temperature dependent polarizations in BaTiO ₃ .	7
	(b)	What is Type I and Type II superconductors? Explain in detail	3