Reg. No.											

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

V SEM B.Tech (BME) DEGREE MAKE-UP EXAMINATIONS, DEC/JAN 2018-19

SUBJECT: BIOMATERIALS AND PROSTHETICS (BME 3103)
(REVISED CREDIT SYSTEM)
Sunday, 23rd December, 2018, 2 to 5 PM

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to Candidates:

1. **Answer ALL questions.**
2. **Use separate answer book for PART A BIOMATERIALS and PART B PROSTHETICS.**

PART A BIOMETERIALS

1A. Explain "Maxwell model'' of viscoelasticity of bone. 4

1B. Compare the isolation process of soluble and insoluble collagen. 3

1C. Explain the basic requirements of cell culture. 3

2A (i) You are asked to fill the cavities of molar tooth using malleted and casted gold, which type of gold would be preferred? Explain. 5

(ii) A particular type of stainless steel, for designing the femoral stem of hemi hip prosthesis, tested during shelf life analysis, showed high content of chromium carbide. Explain the suitability of this type of steel for clinical application.

2B Explain different type composites. Does direction of force have any role in measuring modulus of fiber reinforced composites? Justify with reason. 5

3A With a neat sketch, mention the different materials constituting knee joint implant. 5

3B What do you mean by THA (total hip arthroplasty)? How is THA different from hemi Hip prosthesis? How is a hip implant fixed? 5

PART B PROSTHETICS

4A	With necessary diagrams, explain, in detail, the function of an implantable LVAD, its parts and where, why and how LVAD will be used.	4
4B	How will you validate such a LVAD device before putting into clinical trials? Clearly list out the test phases and discuss in detail 'in-vitro validation.	3
4C	What are the potential complications you can envisage during the clinical use of such a device?	3
5A	Draw the Solute clearance characteristics (Molecular mass Vs Clearance rate) of Low flux and high flux membranes and compare them with that of a natural kidney. Discuss the shape of each of these curves.	3
5B	i) With suitable diagrams, explain the basic design of a knee prosthesis, identify the parts and the materials used. (ii) Discuss, in detail, methods of fixing different parts of the implant to the femur and tibia.	4
5C	Explain the concept of a mobile bearing knee and its advantages over a fixed bearing knee.	3