



DHANALAKSHMI SRINIVASAN INSTITUTE OF TECHNOLOGY

(Approved by AICTE, New Delhi & Affiliated to Anna University)

NH - 45, Trichy - Chennai Trunk Road,

SAMAYAPURAM, TRICHY - 621 112.

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COURSE PLAN

Subject code: BM6010

Branch/Year/Sem/Section: B.E BME/IV/VIII

Subject Name: ASSIST DEVICE

Batch: 2016-2020

Staff Name: R.NISHANTHINI

Academic year: 2019-2020

COURSE OBJECTIVE

- Study various mechanical techniques that will help failing heart.
- Learn the functioning of the unit which does the clearance of urea from the blood
- Understand the tests to assess the hearing loss and development of electronic devices to compensate for the loss.
- Know the various orthotic devices and prosthetic devices to overcome orthopaedic problems.
- Understand electrical stimulation techniques used in clinical applications.

TEXT BOOK:

T1. Levine S.N. (ed), "Advances in Bio-medical Engineering and Medical physics", Vol. I, II, IV, inter university publications, New York, 1968 (Unit I, IV, V).

T2. Kolff W.J, "Artificial Organs", John Wiley and sons, New York, 1976. (Unit II).

T3. Albert M. Cook and Webster J.G, "Therapeutic Medical Devices", Prentice Hall Inc., New Jersey, 1982 (Unit III)

REFERENCES:

R1. D.S. Sunder, "Rehabilitation Medicine", 3rd Edition, Jaypee Medical Publication, 2010

WEB RESOURCES

W1. <https://my.clevelandclinic.org/health/treatments/15840-transcutaneous-electrical-nerve-stimulation-tens> (TOPIC -37,38,39,40,41,42)

W2. <https://hitconsultant.net/2017/05/16/biomedical-engineering-trends/#.XfW8HoMzbiU> (TOPIC-43,44)

W3. <https://www.webmd.com/pain-management/biofeedback-therapy-uses-benefits#1> (TOPIC-45)

TEACHING METHODOLOGIES:

- BB - BLACK BOARD
- VIDEO - VIDEO TUTORIAL
- PPT - POWER POINT PRESENTATION



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DEPARTMENT OF BIOMEDICAL ENGINEERING

BM6010

ASSIST DEVICES

L T P C
3 0 0 3

UNIT I -CARDIAC ASSIST DEVICES

9

Principle of External counter pulsation techniques, intra aortic balloon pump, Auxillary ventricle and schematic for temporary bypass of left ventricle, prosthetic heart valves.

UNIT-HEMODIALYSERS

9

Artificial kidney, Dialysis action, hemodialyser unit, membrane dialysis, portable dialyser monitoring and functional parameters..

UNIT-III HEARING AIDS

9

Common tests – audiograms, airconduction, bone conduction, masking techniques, SISI, Hearing aids – principles, drawbacks in the conventional unit, DSP based hearing aids.

UNIT- IV PROSTHETIC AND ORTHODIC DEVICES

9

Hand and arm replacement – different types of models, externally powered limb prosthesis, feedback in orthodic system, functional electrical stimulation, sensory assist devices.

UNIT V RECENT TRENDS

9

Transcutaneous electrical nerve stimulator, bio-feedback.

TOTAL: 45 PERIODS

| Topic No | Topic Name | Books For reference | Teaching Methodology | No of periods required | Cumulative periods |
|-----------------|--|----------------------------|-----------------------------|-------------------------------|---------------------------|
| 1. | Introduction of ECP | A | BB | 1 | 1. |
| 2. | Principle of External counter | A | BB & VIDEO | 1 | 2. |
| 3. | Advantages of ECP | A | BB | 1 | 3. |
| 4. | intra aortic balloon pump | A | BB | 1 | 4. |
| 5. | Significance of IABP | A | BB | 1 | 5. |
| 6. | Advantages and disadvantages of IABP | A | BB | 1 | 6. |
| 7. | Auxillary ventricle and schematic for temporary bypass | A | BB | 1 | 7. |
| 8. | prosthetic heart valves | A | BB | 1 | 8. |
| 9. | Importance of heart valve | A | BB | 1 | 9. |
| 10. | Artificial kidney | A | BB | 1 | 10. |
| 11. | Significance of artificial Kidney | A | BB | 1 | 11. |
| 12. | Dialysis action | A | BB | 1 | 12. |
| 13. | hemodialyser unit | A | BB | 1 | 13. |
| 14. | membrane dialysis | A | BB | 1 | 14. |
| 15. | Importance of dialyser membrane | A | BB | 1 | 15. |
| 16. | portable dialyser monitoring | A | BB & VIDEO | 1 | 16. |
| 17. | functional parameters | A | BB | 1 | 17. |
| 18 | Advantages and disadvantages | A | BB | 1 | 18 |
| 19 | Common tests | A | BB | 1 | 19 |
| 20 | audiograms | A | BB & VIDEO | 1 | 20 |
| 21 | airconduction | A | BB | 1 | 21 |
| 22 | bone conduction | A | BB | 1 | 22 |
| 23 | masking techniques | A | BB | 1 | 23 |
| 24 | SISI | A | BB | 1 | 24 |

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|----|------------------------------|---|----|---|----|
| 25 | Hearing aids | A | BB | 1 | 25 |
| 26 | principles, drawbacks in the | A | BB | 1 | 26 |
| 27 | DSP based hearing aids | A | BB | 1 | 27 |

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|----|--|----|------------|---|----|
| 28 | Hand and arm replacement | A | BB | 1 | 28 |
| 29 | different types of models | A | BB & VIDEO | 1 | 29 |
| 30 | externally powered limb | A | BB | 1 | 30 |
| 31 | Importance of powered lip prosthesis | A | BB | 1 | 31 |
| 32 | feedback in orthodic system | A | BB | 1 | 32 |
| 33 | functional electrical stimulation | A | BB | 1 | 33 |
| 34 | Advantages of FES | A | BB | 1 | 34 |
| 35 | sensory assist devices | A | BB | 1 | 35 |
| 36 | Examples of sensory assist | A | BB | 1 | 36 |
| 37 | Transcutaneous electrical nerve stimulator | WI | BB | 1 | 37 |
| 38 | Principle of TENS | WI | BB | 1 | 38 |
| 39 | Applications of TENS | WI | BB | 1 | 39 |
| 40 | Advantages of TENS | WI | BB | 1 | 40 |
| 41 | Disadvantage of TENS | WI | BB | 1 | 41 |
| 42 | Advancement | WI | BB | 1 | 42 |
| 43 | Recent Trends | W2 | PPT | 1 | 43 |
| 44 | Application | W2 | PPT | 1 | 44 |
| 45 | bio-feedback | W3 | BB | 1 | 45 |

COURSE OUTCOME

At the end of the course, the student should be able to:

- Explain the functioning and usage of electromechanical units which will restore normal functional ability of particular organ that is defective temporarily or permanently.

CONTENT BEYOND THE SYLLABUS

- Advancement in assist devices

CONTINUES INTERNAL ASSESSMENT DETAILS

| ASSESSMENT NUMBER | I | II | MODEL |
|-------------------|---|---|------------------|
| TOPIC NO.(UNIT) | 1-18(1 st & 2 nd units) | 19-36 (3 rd & 4 th units) | 1-45 (units 1-5) |

ASSIGNMENT DETAILS

| ASSIGNMENT NUMBER | I | II | III |
|----------------------------|---|---|------------------|
| TOPIC NUMBER FOR REFERENCE | 1-18(1 st & 2 nd units) | 19-39 (3 rd & 4 th units) | 1-45 (units 1-5) |
| DEAD LINE | | | |

| ASSIGNMENT NUMBER | BATCH | DESCRIPTIVE QUESTIONS/TOPIC (Minimum of 8 Pages) |
|-------------------|------------|---|
| I | 60 members | <ul style="list-style-type: none"> • Prosthetic heart valves and its importance • Portable dialyser |
| II | 60 embers | <ul style="list-style-type: none"> • DSP based hearing aid • Functional electrical stimulation |
| III | 60 members | <ul style="list-style-type: none"> • Transcutaneous electrical nerve stimulator |