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BIO-MEDICAL ENGINEERING DEPARTMENT

Prepared by: Biomedical Engineer	Approved by: CEO
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AMENDMENT SHEET

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C O N T E N TS

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INTRODUCTION: -

- Bio – Medical Engineering (BME) is the application of engineering principles and techniques to the medical field. It combines the design and problem solving skills of engineering with medical and biological sciences to help improve patient health care and the quality life of individuals.
- The fusion of engineering science with clinical medicine is set to play a central role in the development and improvement of treatment across a range of diseases and medical conditions. Technology can be applied to help save lives through healing or replacement of vital organs, and through the improvement of imaging techniques to detect the onset of disease more effectively.
- **Biomedical engineering (BME)** is the application of engineering principles and design concepts to medicine and biology. This field seeks to close the gap between engineering and medicine: It combines the design and problem solving skills of engineering with medical and biological sciences to advance healthcare treatment, including diagnosis, monitoring, treatment and therapy.
- Biomedical Engineers use engineering principles to solve health related and medical problems. They do a lot of research in conjunction with life scientists, chemists, and medical professionals to design medical devices like artificial hearts, pacemakers, dialysis machines, and surgical lasers. Some conduct research on biological and other life systems or investigate ways to modernize laboratory and clinical procedures. They act as a Communication Bridge between the hospital management and out sourcing supplied vendors/party's.

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- Bio-Medical can be called as Medical Electronics. It's a vast subject which can be formed by clubbing of Engineering, Mathematics, Science, Anatomy, Analog –DSP, Digital electronics, Communication theory, Microprocessors, Mechanical, Electrical & Electronics, Embedded, Safety, Instrumentation and Measurements.
- Frequently, biomedical engineers supervise biomedical equipment maintenance technicians, investigate medical equipment failure, and advise hospitals about purchasing and installing new equipment, R&D and innovations.
- Biomedical engineers work in hospitals, universities, industry, and research laboratories. They are the part of new inventions.

Purpose: -

- To ensure efficient routine, preventive and breakdown of all Medical equipment maintenance.
- To ensure that all the medical equipment are kept in proper working condition by reducing the break-down time.
- To ensure smooth running of all departments by personal functional monitoring for increased performance and efficiency.
- To ensure periodic maintenance and calibration of hospital equipment's for accuracy.
- To ensure good customer relationship for service support and co-operation along with efficient user interference and interaction.
- To ensure fabulous work culture with effective communication and co-ordination with higher officials.
- To ensure Responsibility for planning, installations, certification, demonstrations, and user trainings.
- To attend and solve the complaints in a minimum time period for prompt service.
- To ensure the monitoring and implementing safety standards of medical equipment and practices.

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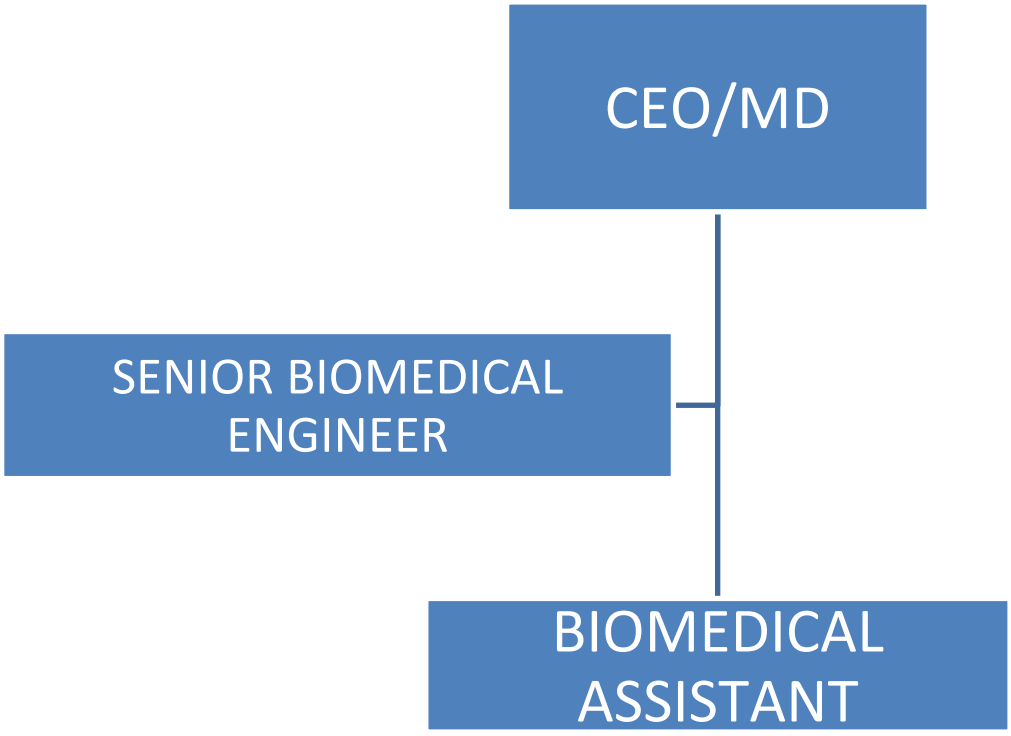
Scope: -

- Supporting services for clinical and hospital equipment's.
- Supporting for emergency, medical, surgical, critical care, procedural, diagnostic and treatment oriented equipment's.
- All Bio-medical equipment's located in O.T's, casualty, ICU's, laboratory, cardiology, radiology, dialysis, endoscopy, physiotherapy, OPD's and wards.

Organogram:-



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Roles &

Senior Biomedical Engineer

- The Bio-Medical In-charge is fully responsible to guide a team of Engineers and Technicians in day-to-day maintenance of various Medical Engineering appliances used in the hospital for effective usage.
- Responsible for giving input to decision on purchasing of new Medical equipment being carried out inside the hospital premises.
- Taking policy decision in co-ordination with the management.
- Responsible to look after welfare of the staff in the Department.
- Long term planning in taking upgradations/modifications of medical equipment.
- Having leadership qualities and navigation.
- Responsible for Warranty concern's, AMC and CMC approvals and insurance claims. Should take initiative & responsible.
- Monitor the Re-agent and Rental contracts, new equip. procurements.
- Planning for equipment procurement for next financial year.
- Responsible for implementing safety standards of medical equipment and practices. Responsible for Quality improvement, safety concerns.
- Personalization of monitoring and verification of certifications and renewals.
- Responsible for new procurements, site planning, installations, demonstrations and user training classes, pending follow-up's.
- Key personal in equipment condemnation committee & planning.
- To ensure the responsibility of prompt decision making and problem solving capabilities with immediate attention & response to reduce the overall break-down time, equipment planning & procurement.
- Responsible for taking the feedback and customer satisfaction report.
- Responsible for performance appraisals, punctual.
- Monitoring the duty rosters and shift duties.
- Monitoring the daily activities of the department.
- Supporting & reporting to management.
- Monitoring the incidence & facilitating the TEAM work.
- To verifying equipment records, break down timing and history cards.

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- Reporting to higher officials and authorities.
- Implementing service utilities, immediate decision making.
- Proving certification for trainees.
- Planning for conducting end user training classes.
- Approvals, finalizations and quality progress.

Biomedical Assistant

- To assist with the BME INCHARGE for departmental activities.
- Daily monitoring the equipment and departments.
- To prepare PM'S planner and intimation.
- To monitor calibration dates.
- To maintain complaint log register.
- To ensure smooth running of all the departments.
- Responsible for functional checks.
- Filing and record maintenance.
- Daily check list monitoring.
- Monitoring TLD badges.
- Immediate call attendance.
- Equipment user and operating manuals.
- Support for Installations and demonstrations.
- Communication with superiors.
- Preparation of attendance records.
- Saving and collecting of software CD's
- Verifying the back up's and free space utilities.
- Carrying the periodic maintenance.
- Supporting to the staff and co-operating with management.
- Reporting the incidence for higher authorities.
- Service co-ordination and closing the issues.
- Monitoring over all voltage consumption.
- Preparation of equipment history cards.
- Training the end user for work efficiency.
- Daily reporting, best approach.

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- Registering the complaints & dedication.
- Record maintenance & documentation.
- Warranty consignments & fallow up's.
- Stuffed & skilled work efficiency.
- Distribution of work, Creative thinking.
- Taking initiative, Motivation.
- Protection & prevention plan.
- Procedural fallow up's & approach.

Job Duties and Tasks for: "Biomedical Engineer"

1)Advise and assist in the application of instrumentation in clinical environments.

2) Conduct research, along with life scientists, chemists, and medical scientists, on the engineering aspects of the biological systems of humans and animals.

3) Design and develop medical diagnostic and clinical instrumentation, equipment, and procedures, utilizing the principles of engineering and bio-behavioral sciences.

4) Develop models or computer simulations of human bio-behavioral systems in order to obtain data for measuring or controlling life processes.

5) Evaluate the safety, efficiency, and effectiveness of biomedical equipment.

6) Install, adjust, maintain, and/or repair biomedical equipment.

7) Research new materials to be used for products such as implanted artificial organs.

8) Adapt or design computer hardware or software for medical science uses.

9) Advise hospital administrators on the planning, acquisition, and use of medical equipment.

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10) Analyze new medical procedures in order to forecast likely outcomes.

11) Design and deliver technology to assist people with disabilities.

12) Develop new applications for energy sources, such as using nuclear power for biomedical-implants.

13) Diagnose and interpret bioelectric data, using signal processing techniques.

14) Teach biomedical engineering, or disseminate knowledge about field through writing or consulting.

Job Activities for: "Biomedical Engineer"

1)**Making Decisions and Solving Problems** -- Analyzing information and evaluating results to choose the best solution and solve problems.
2) Analyzing Data or Information -- Identifying the underlying principles, reasons, or facts of information by breaking down information or data into separate parts.

3) Interacting With Computers -- Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.

4) Getting Information -- Observing, receiving, and otherwise obtaining information from all relevant sources.

5) Updating and Using Relevant Knowledge -- Keeping up-to-date technically and applying new knowledge to your job.

6) Thinking Creatively -- Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions.

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- **Skills Needed for: "Biomedical Engineer"**

- 1)**Science** -- Using scientific rules and methods to solve problems.

  2) Critical Thinking -- Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

  3) Complex Problem Solving -- Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

  4) Reading Comprehension -- Understanding written sentences and paragraphs in work related documents.

  5) Judgment and Decision Making -- Considering the relative costs and benefits of potential actions to choose the most appropriate one.
  6) Active Listening -- Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

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Abilities Needed for: "Biomedical Engineer"

- **Deductive Reasoning** -- The ability to apply general rules to specific problems to produce answers that make sense.

  2) Inductive Reasoning -- The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
  3) Problem Sensitivity -- The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.

  4) Near Vision -- The ability to see details at close range (within a few feet of the observer).

  5) Written Comprehension -- The ability to read and understand information and ideas presented in writing.

  6) Oral Comprehension -- The ability to listen to and understand information and ideas

presented through spoken words and sentences.

7) Information Ordering -- The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

8) Written Expression -- The ability to communicate information and ideas in writing so others will understand.

9) Oral Expression -- The ability to communicate information and ideas in speaking so others will understand.

10) Mathematical Reasoning -- The ability to choose the right mathematical methods or formulas to solve a problem.

11) Category Flexibility -- The ability to generate or use different sets of rules for combining or grouping things in different ways.

12) Originality -- The ability to come up with unusual or clever ideas about a given topic or situation, or to develop creative ways to solve a problem.

13) Flexibility of Closure -- The ability to identify or detect a known pattern (a figure, object, word, or sound) that is hidden in other distracting material.

14) Speech Recognition -- The ability to identify and understand the speech of another person.

15) Visualization -- The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.

16) Selective Attention -- The ability to concentrate on a task over a period of time without being distracted.

17) Number Facility -- The ability to add, subtract, multiply, or divide quickly and correctly.

18) Speech Clarity -- The ability to speak clearly so others can understand you.

19) Fluency of Ideas -- The ability to come up with a number of ideas about a topic (the number of ideas is important, not their quality, correctness, or creativity).

20) Perceptual Speed -- The ability to quickly and accurately compare similarities and differences among sets of letters, numbers, objects, pictures, or patterns. The things to be compared may be presented at the same time or one after the other. This ability also includes comparing a presented object with a remembered object.

21) Finger Dexterity -- The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.

Knowledge, Experience, Education Required for: "Biomedical Engineer"

1) **Biology** -- Knowledge of plant and animal organisms, their tissues, cells, functions, interdependencies, and interactions with each other and the environment.
2) Mathematics -- Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
3) Engineering and Technology -- Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
4) Physics -- Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub- atomic structures and processes.
5) English Language -- Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
6) Chemistry -- Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.
7) Medicine and Dentistry -- Knowledge of the information and techniques needed to diagnose and treat human injuries, diseases, and deformities. This includes symptoms, treatment alternatives, drug properties and interactions, and preventive health-care measures.

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8) Design -- Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
9) Computers and Electronics -- Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

Duties

Biomedical engineers work closely with life scientists, chemists and medical professionals (physicians, nurses, therapists and technicians) on the engineering aspects of biological systems.

Duties and responsibilities vary from one position to another but, in general, biomedical engineers:

- Design and develop medical devices such as artificial hearts and kidneys, pacemakers, artificial hips, surgical lasers, automated patient monitors and blood chemistry sensors
- Design and develop engineered therapies (for example, neural-integrative prostheses)
- Adapt computer hardware or software for medical science or health care applications (for example, develop expert systems that assist in diagnosing diseases, medical imaging systems, models of different aspects of human physiology or medical data management)
- Conduct research to test and modify known theories and develop new theories
- Ensure the safety of equipment used for diagnosis, treatment and monitoring
- Investigate medical equipment failures and provide advice about the purchase and installation of new equipment
- Develop and evaluate quantitative models of biological processes and systems
- Apply engineering methods to answer basic questions about how the body works
- Contribute to patient assessments
- Prepare and present reports for health professionals and the public
- Supervise and train technologists and technicians.

Personal Characteristics

Biomedical engineers need the following characteristics:

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- A strong interest in engineering and medicine
- The ability to think analytically and solve problems
- An aptitude for science and mathematics
- The ability to visualize complex processes and equipment
- Good oral and written communication skills
- Creativity and persistence
- A willingness to improve their knowledge and skills on an ongoing basis
- The ability to work effectively with people from various disciplines and educational backgrounds.

DEPARTMENTAL ACTIVITIES:-

1. Daily rounds
2. Logging and registering the complaints
3. Solving the problems
4. Closing the pending issues
5. Listing of all equipment
6. Coding and asset numbering
7. Site planning
8. New installations and demonstrations
9. Servicing and repairing
10. Conducting training classes
11. Spreading awareness programs
12. Interacting with users
13. Allocation of equipment
14. Incident reporting
15. Gravience handling
16. Root cause analysis
17. Verification and validation
18. Selection and finalization
19. Choosing the best quality process
20. Safety concerns
21. Carrying calibrations
22. Camp supports
23. Warranty monitoring
24. Daily reporting
25. Filing and documentation

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26. Certification & justification
27. Feedbacks on satisfaction reports
28. Maintenance and managing
29. QA/QC checks
30. Problem analysis
31. PM's scheduling and planning
32. Traceability verifications
33. Supporting services
34. Team work
35. Helping in purchase
36. Collecting quotation's
37. Taking responsibilities
38. Proper handling of equipment
39. Validity and due checks
40. Record works.
41. Register maintenance
42. Manuals listing.
43. Collecting backup's & SW cd's
44. Selection process
45. Day to day reporting
46. Follow up's & daily monitoring
47. Co-ordination & co-operation
48. Affordable relations with vendors
49. Diplomatic dealing
50. Effective communication
51. Prior intimation to higher officials
52. Gate pass follow up's
53. Identifying the problems
54. Functionality checks & scope of services.
55. Competitive techniques
56. Immediate response and decision making
57. Managing, operating & handling of various equipment.
58. Priority identification & emergency support.
59. Work allocation & segregation.
60. Controlling costs & incidence.
61. Knowledge of BME waste management
62. Awareness of everything

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63. Enrollments & safety policies.
64. Idea of cost cuttings & safety concerns.
65. Technically skilled performance.
66. Emergency purchases, Replacements.
67. Service utilities with diplomatic dealing.
68. Should maintain a good relation and communication.
69. Interacting with user departments.
70. Friendly approach in equip. handling.
71. General checks and testing's.
72. Quantitative differential approach.
73. Performance and Quality improvements.
74. Modifications, System & Software up gradations.

DEPARTMENTAL FUNCTIONAL PROCEDURE: -

PREVENTIVE MAINTENANCE PLAN

1) A detailed List of equipment with AMC & calibration list is maintained by biomedical department.
2) Most of the medical equipment are serviced by the suppliers themselves.
3) In house preventive maintenance of various facilities and equipment are carried out as per preventive maintenance checklist.
4) An operating manual of equipment is kept with respective departments for its daily maintenance and for dusting.
5) A equipment log book with date, instrument start time, operated by, instrument shutdown/unplug time, shutdown by, breakdown/complain data, informed to and time of information, date & time of the problem withdrawal, remarks and signature is maintained by department in-charge for checking the frequency level of breakdown complaints get resolved.
6) Equipment's are operated by authorized personnel only. Up-to date instructions, on the use and maintenance of equipment given by manufacturers are made readily available with Bio-Medical department.
7) AMC/CMC frequency and the records of AMC/CMC with are available in the department.

WARRANTY:-

- To see what are all covered in warranty spares etc..,

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- To verify warranty consumables and consignments.
- To monitor warranty considerations.

RENTAL OR REAGENT CONTRACTS:-

- To monitor what are all equipment's covered in RC.
- To check the RC period.
- To verify the STD., terms and conditions.
- To monitor the legal bonds, agreements and commitments.
- Verifying legal issues.

INSURANCE POLICIES:-

- To see what are all equipment's, scopes and probes covered under insurance.
- Insurance claims.
- Renewals, payments.
- Monitoring terms and conditions.
- To verify medical claim policies.

INSTALLATION PROCEDURE OF NEW EQUIPMENTS:-

- This process is to ensure the smooth installation and commissioning of all medical equipment's in the hospital. Following are the key elements associated with this process.
- Pre Installation requirements get from the company.
- Receive the equipment.
- Verification of equipment along with the Purchase order.
- Installation of equipment at the site.
- Testing and commissioning.
- Handover the equipment to the user department.
- Equipment is added to the Asset list.
- Asset Number sticked on the Equipment.

Procedure for preventive maintenance of equipment's:-

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- Preventive maintenance schedule for all the Equipment's made for the entire year.
- Prepare the list of equipment's to preventive maintenance internal / external.
- Coordinating with the Companies for the preventive maintenance of the equipment's.
- After preventive maintenance, Filing the reports and update in the stickers on the equipment's and equipment History card.

ASSET CODING:-

- Providing a unique sequential numbering for all medical equipment's for permanent and easy identification & addressing.

CALIBRATION OF EQUIPMENTS: -

- The objective of this process is to include all the relevant medical equipment in the hospital under a calibration program as per the calibration schedule.
- Key elements of the process are listed below:-
- Prepare the calibration. Schedule for all the equipment for the entire year.
- Coordinating with the Companies for the calibration as per the schedule.
- Perform the calibration and get the calibration certificates from the company.
- Update the sticker on the machine and the history cards.

CONDEMNATION:-

- Monitoring the cost, availability of spares, Clearance from management.
- Verifying the model, outdated status, Approvals.
- Monitoring total service cost spent on the equipment.
- Affordability, spare cost, Committee suggestions.
- Liability of service and functional performance.

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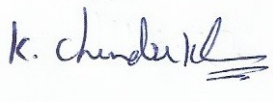	

EQUIPMENT SELECTION:-

The department follows hospital's plan for equipment for new purchases, replacements and additional technology / equipment. As per the plan and / or request by the user, a multidisciplinary committee works together to get the required equipment. Comp rations, feedbacks, evaluation, analysis, technology, working principles, economic, service, listing, quality, choosing the best. The decision is taken in consultation with various people, which includes the following,

- Top Level Management
- Consultant of concern department
- Purchase department
- Biomedical engineering department
- Finance department

Validation & verification of Breakdown / Preventive Maintenance:-

Validation of the proper functioning of the equipment's after every preventive maintenance & major break down is done by HOD before using for reporting by following performance qualification protocol for the equipment's.

BREAK DOWN PROCEDURE: -

1. In-case of breakdown user department informs the concerned person for repairing & enters into maintenance call slip.
2. Study the nature of breakdown, take necessary action accordingly. (Repairing/ replacing).
3. Check the work comes under in-house maintenance or service contract or contractor.
4. Get the signature of the concerned user department after completion of job & take the duplicate copy of Maintenance call slip.
5. Record the job done in the breakdown register.
6. Analyze the nature of the breakdown / complaint and take appropriate action for contacting external service provider.
7. Should have a list of spares replaced and enclosed with proper documentation.

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INCIDENT REPORTING:-

1. Noticing the incidents.
2. Intimating to concern HOD's.
3. Informing to top level management.
4. Incident report generation.
5. Handling of the incidents.
6. Retraining the concern user.

GATE PASSES:-

Sending the equipment outside of the hospital premises for repairing and service, returning of damaged/defective goods etc.., with proper authentication.

1. RGP: - follow-up's
2. NRGP: - closing

MONITORING OF PERFORMANCE INDICATORS:-

- Response time
- Down time
- Outsource Response time

METHODOLOGY:-

RESPONSE TIME:

- Bio-medical department will record the call received time and then Attended the call and again record that time, means

  The difference between: XY - ZZ = AA

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Here, XY: Call received time
ZZ: Call attended time
AA: Response time.

DOWN TIME:

- Bio-medical department will record the call received time and then Attended the call and again record that attended time and then handed over time to find Down time, means

  The difference between: YY - XX = BB

  Here, YY: Handed over time
  XX: Call attended time
  BB: Down time.

OUTSOURCE RESPONSE TIME:

- In case bio-medical department need to call outsource agency then they will record the calling time and when outsourced agency attend the call that time will be recorded that, means,
  Outsourced response time (OR): The machine total Down time (BB) + outsourced attending time (OO): YY - XX = BB
  Here, BB: Down time
  OO: Outsourced attended time
  OR: Outsource Response time.

MONITORING:-

- All response time, down time, will be Calculated of all equipment monthly basis and improvement plan will be made, checked and monitored.

SERVICE EFFIENCY:-

Call Time-Response Time/Completion Time*100

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RECORDS:-

1. Preventive Maintenance file.
2. Breakdown maintenance calls register.
3. Master equipment list.
4. Daily rounds register.
5. AERB files.
6. QA/QC reports.
7. Plan site approval and lay out files.
8. BME service reports.
9. Manuals' and software CD's.
11. Lab service reports.
12. Calibration reports.
13. Installation report file.
14. Department manual files.
15. Check list file.
16. Departmental SOP's.
17. Warranty cards file.
18. AMC & CMC file.
19. Quotation file.
20. Purchase order file.
21. Daily complaints register.
22. Online log register.
23. Incident report file.
24. Inventory register file.
25. Departmental equipment list.

PREVENTIVE MAINTENANCE CHECKLIST OF ALL MEDICAL EQUIPMENT:-

1	PREVENTIVE MAINTENANCE CHECKLIST OF ANAESTHESIA WORK STATION
2	PREVENTIVE MAINTENANCE CHECKLIST OF C-ARM
3	PREVENTIVE MAINTENANE CHECKLIST OF MONITORS
4	PREVENTIVE MAINTENANCE CHECKLIST OF VENTILATOR

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5	PREVENTIVE MAINTENANCE CHECKLIST OF PIPELINES,VACCUUM &AIR COMPRESSORS
6	PREVENTIVE MAINTENANCE CHECKLIST OF DIATHERMY
7	PREVENTIVE MAINTENANCE CHECKLIST OF DIALYSIS MACHINE
8	PREVENTIVE MAINTENANCE CHECKLIST OF ULTRASOUND MACHINE
9	PREVENTIVE MAINTENANCE CHECKLIST OF ABG MACHINE
10	PREVENTIVE MAINTENANCE CHECKLIST OF CATH LAB
11	PREVENTIVE MAINTENANCE CHECKLIST OF CT SCAN
12	PREVENTIVE MAINTENANCE CHECKLIST OF X-RAY MACHINE
13	PREVENTIVE MAINTENANCE CHECKLIST OF PORTABLE X-RAY
14	PREVENTIVE MAINTENANCE CHECKLIST OF ACT MACHINE
15	PREVENTIVE MAINTENANCE CHECKLIST OF ECG MACHINE
16	PREVENTIVE MAINTENANCE CHECKLIST OF DEFIBRILLATOR
17	PREVENTIVE MAINTENANCE CHECKLIST OF HEART LUNG MACHIINE
18	PREVENTIVE MAINTENANCE CHECKLIST OF HEMOTHERM MACHINE
19	PREVENTIVE MAINTENANCE CHECKLIST OF STERNALSAW MACHINE
20	PREVENTIVE MAINTENANCE CHECKLIST OF INCUBATOR MACHINE
21	PREVENTIVE MAINTENANCE CHECKLIST OF WARMER MACHINE
22	PREVENTIVE MAINTENANCE CHECKLIST OF PORTABLE INCUBATOR MACHINE
23	PREVENTIVE MAINTENANCE CHECKLIST OFO.T .LIGHT
24	PREVENTIVE MAINTENANCE CHECKLIST OF O.T.TABLE
25	PREVENTIVE MAINTENANCE CHECKLIST OF ELECTRIC SUCTION APPARATUS
26	PREVENTIVE MAINTENANCE CHECKLIST OF E.T.O MACHINE
27	PREVENTIVE MAINTENANCE CHECKLIST OF AUTOCLAVE MACHINE
28	PREVENTIVE MAINTENANCE CHECKLIST OF IABP MACHINE
29	PREVENTIVE MAINTENANCE CHECKLIST OF PRESS.INJECTOR
30	PREVENTIVE MAINTENANCE CHECKLIST OF FULLY AUTO ANALYZER
31	PREVENTIVE MAINTENANCE CHECKLIST OF SEMI AUTO ANALYZER
32	PREVENTIVE MAINTENANCE CHECKLIST OF 2D-ECHO MACHINE
33	PREVENTIVE MAINTENANCE CHECKLIST OF TMT MACHINE
34	PREVENTIVE MAINTENANCE CHECKLIST OF PFT MACHINE
35	PREVENTIVE MAINTENANCE CHECKLIST OF ENDOSCOPY
36	PREVENTIVE MAINTENANCE CHECKLIST OF MRI MACHINE

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