

MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK
Examination Scheme
Diploma in Radiation Medicine (D.RM)

The scheme and Pattern of examination for the Diploma shall be as under:

1. Theory: Total 240 marks

Paper I: Basic Sciences & Instrumentation
(One paper -3 hrs- 80 marks)

Paper II: Radiopharmaceuticals & Radioimmunoassay
(One paper -3 hrs- 80 marks)

Paper III: Clinical Nuclear Medicine
(One paper -3 hrs- 80 marks)

Pattern of Question Papers:

Each question paper (80 marks) will have Multiple choice questions (MCQ), short answer question (SAQ) and long answer question (LAQ). The mark distribution will be as follows:

- | | |
|------------------------------------|----------------|
| • MCQ: 25 questions -1 mark each; | Total 25 marks |
| • SAQ: 5 questions -5 marks each; | Total 25 marks |
| • LAQ: 2 questions -15 marks each; | Total 30 marks |

Total = 80 marks

2. The Practical examination will consists of:

Basic Sciences Experiments	-60 marks
Long Case	-60 marks
Short case	-30 marks Clinical
Application Experiment	-30 marks
Oral examination (Grand Viva)	-60 marks (30 each)

Total = 240 marks

3. Internal Assessment: (Includes Theory, Practical, Journal and Apprenticeship) Marks Distribution:

Theory, Apprenticeship	-60 marks
Practical (Basic science and Viva)	-30 marks
Practical (Clinical case and related Experiment)	-30 marks

-Total = 120 marks

SYLLABUS FOR D.R.M.

The syllabus for various topics prescribed for the examination under different heads is as follows :- .

I. Internal Assessment :

1. Basic mathematics required for understanding nuclear Physics, nature of radioactivity, radioactive decay, tracer kinetics etc. e.g.
 - (i) Logarithmic and exponential functions
 - (ii) Differentiation and integration
 - (iii) Compartmental analysis
2. Basic medical statistics.
3. Basic Radiation Biology
4. Basic principles of immunology
5. Basic principles of chemical reactions relevant to preparation of radiopharmaceuticals.
6. SI Units useful in medical sciences.

II. Physical sciences :

A. Structure of matter; radionuclides, radioactive emissions, radioactive decay, emission spectra; interaction of radiation with matter; units of radioactivity; production of radioisotopes.

B. Radiation Detection :

Different types of detectors used in nuclear medicine; different electronics instruments associated with these detectors; principles of in vitro and in vivo counting of radioactivity , counting statistics.

III. Radiation Protection :

A. Units of Radiation dose, concept of maximum permissible exposures evaluation of radiation exposure and hazards, external exposure, internal radiation.

B. Radiation dosimetry

C. Radiation protection: principles of methods, instruments used in radiation protection.

D. Planning and layout of a nuclear medicine laboratory.

E. National and International radiation protection regulations.

F. Waste disposal in a nuclear medicine laboratory.

IV. Radiopharmaceutical :

A. Physical and chemical characteristics of radionuclides used in nuclear medicine.

B. Radiopharmacy: generator produced radiopharmaceuticals.

C. Criteria for selection of radio nuclides.

D. Biological behavior" of radiopharmaceuticals.

E. Quality Control.

V. In-Vivo Studies :

- A. Stationary and moving detector imaging systems, collimators.
- B. Storage, processing and display systems) use of computers.
- C. All imagit18 techniques in outline application. Comparison with other imaging modalities.
- D. Use of single and multiple head detector systems-
- E. Calibration and quality assurance methods.
- F. whole body counting and profile scanning.

VI. In-Vitro Studies :

- A. Compartmental analysis
- B. Autoradiography
- C. Radiorespirometry

VII. Radiimmunoassays and related techniques :

General principles, methods, quality control, labeling of ligands, in vitro and in vivo thyroid function studies etc.

Receptor assays

Enzyme linked immunoassays/

VIII. Radionuclide therapy:

IX. Administrative aspects of nuclear medicine :

Cost-benefit, efficacy Studies; role of nuclear medicine in diagnostic decision makit1g, professional ethics.

X. Applications or nuclear medicine in various diseases :

Haematologic, lymphatic and RES system, genitourinary system, central nervous system, gastrointestinal system (including liver and pancreas), respiratory system, cardiovascular system, skeletal system and joints, endocrine system, metabolism, body compartments and composition, oncology. (as under)

Detail or topics in "Application of Nuclear Medicine" :

I

- 1. Nuclear Medicine in acute care.
 - a) AMI
 - b) DVT and Pulm. embolism
 - c) GI bleeding
 - d) Cholescintigraphy ----> Cholecystitis -acute + chronic
 - Bile leak
 - Hemobilia
 - e) Hepatic and splenic trauma
 - f) Acute scrotal pain
 - g) Acute neurological cases ---> CVA
 - Headit18
 - Encephalitis
 - Brain death
 - h) Infection

18. Radiation exposure: effect of distance.
19. Shielding.
20. Radiation Survey.
21. Decontamination
22. Radiopharmacy procedures, elution of generators, preparation of different radiopharmaceuticals,
23. Grey scale calibration (calibration of a photo scanner).
24. Phantom studies for scintigraphy,
25. Flood field for scintigraphy
26. Organ imaging
27. Photographic development
28. Profile scanning
29. Analog studies with single or Multiple probes.
30. Dilution principle
31. Flow measurement ,
32. Renogram
33. Thyroid uptake
34. Radioimmunoassay's of various t}Pes,
35. IRMA

Standard for Passing the Examination

- In order to pass in the Internal Assessment for which the examination will be conducted by the Institutions conducting the course a candidate must obtain 50 per cent of the aggregate marks prescribed.
- No candidate will be allowed to appear for the written and practical examination conducted by the University unless he has obtained the required number of aggregate marks in the Internal Assessment for passing.
- In order to pass the University examination a candidate must obtain 50 per cent of the aggregate of the marks assigned to the papers. In the Practical Examination, the candidate must obtain 50% of marks under each head, namely, Basic Sciences Experiments, Clinical cases and Oral examination.

MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK
DIPLOMA IN RADIATION MEDICINE (D.R.M.)

(Revised Course)

CANDIDATES			INTERNAL ASSESSMENT		THEORY					PRACTICALS				Grand Total	No	Remarks
			Core Subjects (Sessional)	Apprentice Work (Sessional)	Theory Paper –I Basic Sciences and Instrumentation	Theory Paper- II Radio Pharmaceuticals	Theory Paper-III Clinical Nuclear Medicine	Theory Paper-IV Clinical Nuclear Medicine	Total of 4 Theory Papers	Basic Science Experiments	Clinical(LongCase Short Case	Oral				
Viva	Dessertation															
			<u>50</u> 25	<u>50</u> 25	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>400</u> 100	<u>100</u> 50	<u>100</u> 50	<u>50</u> 25	<u>50</u> 25	<u>800</u>		