

Dec 2006/4

1. Generator produced PET tracer & their application. Briefly mention about the basic principle of concentration of Radiotracer (10-12/06)
2. Fan beam collimator(10-12/06)
3. Specific absorption fraction(10-12/06)
4. HVL & TVL of Radiation shield. (10-12/06)
5. Quenching in GM counter(10-12/06)
6. LET (10-12/06)
7. Derive equation of radioactive decay. Define decay constant, T1/2. Calculate the mass of 1 Ci of carrier free iodine 131. (10-12/06)
8. Describe transit & secular equilibrium of radionuclide. Illustrate with routinely used generator system. (10-12/06)

Dec 2006/3

1. Clinical application of Non- FDG scintigraphy. (10-12/06)
2. Radionuclide Procedure for organ transplant assessments. (10-12/06)
3. Assessment of infectious bone lesion with NM technique. (10-12/06)
4. Clinical impact of co-registration imaging. (10-12/06)
5. Work-up, treatment of thyrotoxicosis pregnant lady. (10-12/06)
6. PLOPED criteria for pulmonary embolism & its drawbacks. (10-12/06)
7. Scope of NM in neonatal hyper bilirubinemia (10-12/06)
8. Radionuclide technique for breast malignancy. (10-12/06)
9. NM in management of patient of epilepsy. (10-12/06)
10. Palliation of bone pain with Radionuclide(10-12/06)

Dec 2006/2

1. characteristics of radionuclides for bone palliation(10-12/06)
2. QC of RPs (10-12/06)
3. RPs for SPECT brain imaging(10-12/06)

4. Gives an account for non –fluoridal PET RPs(10-12/06)
5. Methods & usefulness of in-vivo labeling of RBCs(10-12/06)
6. Role of radio labelled peptides in diagnosis & therapy(10-12/06)
7. Tracer in use for MPI(10-12/06)
8. RPs for liver imaging (10-12/06)
9. RPs in diagnosis & FU of neuro-endocrine disorders. (10-12/06)
10. Adv n Dis-adv of ^{99m}Tc generator systems(10-12/06)

Dec 2006/1

1. Radioactive waste disposal (10-12/06)
2. The procedure minimizing Radiation hazards (10-12/06)
3. Radiation hormeosis(10-12/06)
4. The principle of PET imaging (10-12/06)
5. Personal monitoring (10-12/06)
6. The interaction radiation with matter(10-12/06)
7. Neutron Monitoring. (10-12/06)
8. Oxygen enhancement Ratio. (10-12/06)
9. Auto radiography(10-12/06)
10. Apoptosis Imaging (10-12/06)

2005/II

1. Rhenium Generator(10-2005)
2. Non isotopic assay labels(10-2005)
3. Tumour imaging agants(10-2005)
4. SPECT analogues of PET RPs(10-2005)
5. RPs for Cardiac metabolism assessment(10-2005)
6. Infection imaging Agents(10-2005)
7. RPs in Kidney transplants(10-2005)
8. Radio-isotopes in mets bone palliation (10-2005)
9. Radio-isotopes in Radiation synovectomy(10-2005)
10. Various RPs in emergency room with indication(10-2005)

2005/III

1. Intervention in NM(10-2005)
2. Clinical utility in Imaging fusion(10-2005)
3. PET in oncology(10-2005)
4. Therapy of hyperthyroidism(10-2005)
5. GE function studies(10-2005)
6. Renal dynamic scan & its indication(10-2005)
7. Clinical utility of myocardial viability study(10-2005)
8. Functional Brain imaging with SPECT(10-2005)
9. RBC survival and sequestration studies(10-2005)
10. Breast Cancer & nuclear technique(10-2005)

1993/I

1. You have been appointed as NM consultant cum RSO in new set up. Design your facilities from health physics points of view keeping the following points in mind: dept protection, health physics equipments would you like to purchase with justification & personal monitoring.(25-1993)
2. Salient features of ICRP-60(15-1993)
3. Cell survival curve (15-1993)
4. Repair of sub lethal damage(15-1993)
5. Oxygen enhancement ratio(15-1993)
6. Radiation protection aspect of iodination of biomolecule(15-1993)

1993/II

1. Describe the ^{99}Mo - $^{99\text{m}}\text{Tc}$ generators available. What are the merits and demerits associated with them? Describe the principle on which daughter nuclides are separated from the parents.(25-1994)
2. NM Techniques in Trauma injuries. (15-1994)
3. NM techniques in evaluation of chronic renal failure. (15-1994)
4. NM techniques in Rt upper quadrant pain. (15-1994)
5. NM techniques in in peripheral vascular abnormalities. (15-1994)
6. Cyclotron produced RPs for evaluation of myocardial damage(15-1994)

1993/III

1. Discuss the current status & prospects of radionuclide evaluation in IHD..(25-1994)
2. Granulocytes scintigraphy. (15-1994)
3. Radionuclide therapy in intractable bone pain. (15-1994)
4. Augmented cholescintigraphy. (15-1994)
5. Intervention NM in dysthyroid assessment. (15-1994)
6. Radionuclide assessment in obstructive uropathy. (15-1994)

1993/I

1. Discuss the cyclotron & cyclotron produced radio-isotopes used for imaging- its merits and demerits.(25-1994)
2. Cerenkov radiation. (15-1994)
3. Auger electron(15-1994)
4. TLD(15-1994)
5. Free radicals (15-1994)
6. Radiation sensitizer. (15-1994)

1994/I

1. Discuss the recent development in PET in particular reference to RPs.(25-1994)
2. Isomeric transition (15-1994)
3. Interaction Gamma radiation with matter (15-1994)
4. Leucocytes labelling (15-1994)
5. QC of SPECT (15-1994)
6. Health effect of low level radiation (15-1994)

1994/II

1. Discuss the role of radionuclide technique in the development & testing of new drugs in medicine.(25-1994)

2. Discuss the utility of Tc-99m in Glucoheptonate in NM (15-1994)
3. Discuss somatostatin receptor scintigraphy (15-1994)
4. Discuss the role 99mTc- Sestamibi in NM (15-1994)
5. Discuss the problems in SPECT imaging & the strategies used to overcome them (15-1994)
6. What is the role of “Hand-held” probes in detection of the radiotracer in patients. (15-1994)

1994/III

1. Describe briefly the sources of the technical error in 201Tl myocardial stress study. Compare and contrast the various RPs used for myocardial viability.(25-1994)
2. Different techniques of Leucocyte labeling & their clinical utility (15-1994)
3. Diagnosis & managements of Medullary Ca thyroid. (15-1994)
4. RPs for regional cerebral blood flow studies(15-1994)
5. Radio-immunotherapy(15-1994)
6. Intervention in GI NM procedures(15-1994)

1994/III

1. As NM specialist you are directed to submit detailed project report for starting NM service in a 300 bedded multispeciality hospital. Discuss how you would proceed & meet the statutory requirements. (25-1994)
2. Pulse height analyzers(15-1994)
3. Poisson’s distribution(15-1994)
4. Auger electron (15-1994)
5. Effective half life(15-1994)
6. LET(15-1994)

1994/I

1. Iso-baric transition (10-1994)
2. Ionization chamber (10-1994)
3. Mechanisms of localization of radioactive imaging agents (10-1994)
4. Methods of Radio-iodination of proteins. (10-1994)

5. Factors affecting image formation in NM. (10-1994)
6. Developments in PET techniques. (10-1994)
7. Dose response models. (10-1994)
8. Radiation dose limiting recommendations. (10-1994)
9. Institutional storage & disposal of radioactivity. (10-1994)
10. QC in Radio-immunoassay. (10-1994)

1994/II

1. Discuss the various NM strategies used for the detection of Infection/ Inflammation (25-1994)
2. Enumerate various RPs for SPECT brain studies indicating their clinical utility. (15-1994)
3. Discuss the Adv & limitations of various RPs used in Lung ventilation imaging (15-1994)
4. Discuss the assessment of functioning hepatocytes & hepatic blood flow with radionuclide techniques(15-1994)
5. Discuss ambulatory Lt ventricular function monitoring with Radionuclide techniques(15-1994)
6. Discuss the role of 18F-FDG PET imaging in oncology. (15-1994)

1994/III

1. Ejection fraction assessment of the Lt Ventricle by RN techniques. Causes of over & under estimation (10-1994)
2. Usefulness of renal transit times in various renal disorders. (10-1994)
3. Augments cholescintigraphy. (10-1994)
4. Acetazolamide intervention. (10-1994)
5. RPs used for localization Tumors. (10-1994)
6. Rx for Polycythemis vera(10-1994)
7. Thyroid function in children- indication and contra-indication. (10-1994)
8. Recent advances in imaging of Infective lesions. (10-1994)
9. Image enhancement techniques in Radio-Immunoscintigraphy(10-1994)
10. MIBG scintigraphy. (10-1994)

1994/IV

1. Describe the features of an ideal computers in NM for imaging & report generation (25-1994)
2. Standard deviation (15-1994)

3. Transient equilibrium (15-1994)
4. Disposal of Radioactive waste (15-1994)
5. Pair production (15-1994)
6. LET (15-1994)

1995/I

1. Surface contamination limits in NM lab (10-1995)
2. Personal monitoring (10-1995)
3. ICRP-60. Recommendation for radiation workers, Public & pregnant women. (10-1995)
4. Transport of Radioactive waste material(10-1995)
5. SI units of Radiation Quantities. (10-1995)
6. Genetic effect of Radiation. (10-1995)
7. Gas Filled Detectors. (10-1995)
8. QC of radio-immunoassay (10-1995)
9. Acute radiation (whole body) effect. (10-1995)
10. Outline Radiation handling procedures. (10-1995)

1995/II

1. Discuss the details NM procedures in management of Differentiated thyroid function (25-1995)
2. Radionuclide studies in the assessment of Renal Transplant complications (15-1995)
3. Role of NM procedures in the diagnosis of Pulmonary embolism (15-1995)
4. TSH estimation by IRMA(15-1995)
5. Indication & RPs used for bone marrow imaging. (15-1995)
6. Pharmacodynamics of Hepato-biliary RPs. (15-1995)

1995/III

1. Outline the common methods of GFR estimation. Described briefly compartmental method of GFR estimation. Critically discuss their applications in routine clinical practice. (25-1995)
2. Patients has following blood picture
Hb:-6 gms, Retic cts:-20%, MCHC:-26% MCV:-105, WBC:-15000, Platelets:-200000,
Sr. Bilirubin:-2mg%, Coombs direct:- +ve,

Blood film report: - Spherocytosis, anisopoikilocytosis, anisochromia,

Discuss how the diagnosis might be elicited using radioactive isotope technique. (15-1995)

3. RN investigations in oesophageal pain.(15-1995)
4. Brain SPECT in epilepsy(15-1995)
5. Dobutamine 201Tl imaging. (15-1995)
6. RN therapy for palliation of bone pain. (15-1995)

1995/IV

1. Secular equilibrium (10-1995)
2. Annihilation Radiation. (10-1995)
3. Co-efficient of variation. (10-1995)
4. Safe Handling of Beta Emitters. (10-1995)
5. Principle of Medical Cyclotron. (10-1995)
6. Basic principle (Nuclear physics) of film badge. (10-1995)
7. Principle of SPECT instrumentation. (10-1995)
8. Fallout effects of Chernobyl accidents. (10-1995)
9. Well type counter. (10-1995)
10. Modulation transfer function. (10-1995)

1995/I

1. You have been appointed as NM consultant cum RSO in a set up which plans to perform static/dynamic imaging procedure along with radio-iodine therapy for cancer thyroid patients. Keeping in mind the above mentioned points justify the facilities you would like to plan in terms of location and space: Health Physics, equipments, Layout & staff. (25-1995)
2. Acute Radiation syndrome(15-1995)
3. ALI(15-1995)
4. Isomeric Transition(15-1995)
5. Radiation quantities & their units. (15-1995)
6. Radio-protective drugs(15-1995)

1995/II

1. Discuss patho-physiology of Renal causes of Hypertension & detail the Radio-nuclide procedure you would undertake to assist in management. (25-1995)
2. Newer RPs in Nuclear cardiology work-up. (15-1995)
3. Utility if SPECT cerebral flow studies. (15-1995)
4. PET studies in Tumor imaging. (15-1995)
5. Describe patho-physiology of Dys hormonogenic goiter & role of NM in the diagnosis. (15-1995)
6. QC of RPs. (15-1995)

1995/III

1. Radio-nuclide investigations in children with recurrent UTI. (10-1995)
2. Diagnosis of pulmonary embolism using V/Q scan. (10-1995)
3. Role of NM in management of Polycythemia vera. (10-1995)
4. Radionuclide ventriculography in cardiomyopathy. (10-1995)
5. Bone scan in reflux sympathetic dystrophy syndrome. (10-1995)
6. Ga-67 in sarcoidosis. (10-1995)
7. TSH(IRMA) (10-1995)
8. Radionuclide scanning in diagnosis of hepatic hamangioma. (10-1995)
9. Hypothyroidism following 131-I therapy in thyrotoxicosis. (10-1995)
10. Radionuclide detection of ectopic gastric mucosa(10-1995)

1995/IV

1. Radiochemical Purity. (10-1995)
2. Bremstrahlung. . (10-1995)
3. Poisson distribution. (10-1995)
4. Precaution drug radioiodination. (10-1995)
5. N-gamma reaction. (10-1995)
6. TLD. (10-1995)
7. Principles of PET instrumentation. (10-1995)
8. Management of radioactive spill in a big NM dept of the hospital. (10-1995)
9. Thyroid probes. (10-1995)
10. Half value layer. (10-1995)

1996/I

1. Describe various aspect of biological effect of radiation & how they can be enhanced for more effective treatment of malignant tumors (25-1996)
2. Acute radiation syndrome. (15-1996)
3. Difference between SPECT & PET. (15-1996)
4. ALARA. (15-1996)
5. Units used in radiation science. (15-1996)
6. Personal monitoring by film badge & TLD. Merits & demerits of these two methods. . (15-1996)

1996/II

1. Describe the mechanism of localization of RPs used for hepatic studies & discuss the indication of hepatic imaging. (25-1996)
2. Imaging in CSF rhinorrhoea. (15-1996)
3. RPs in myocardial imaging. (15-1996)
4. Lymphoscintigraphy. (15-1996)
5. Positron emitter. (15-1996)
6. ELISA. (15-1996)

1996/III

1. Describe the principle, procedure clinical utility of captopril scintigraphy in RAS. (25-1996)
2. Role of NM in diagnosis of pulmonary embolism. (15-1996)
3. Schilling test. (15-1996)
4. Detection of Deep vein thrombosis. (15-1996)
5. Neuro-receptor imaging. (15-1996)
6. Hashimoto's thyroiditis. (15-1996)

1996/IV

1. Concept of radiation hormeosis. (10-1996)
2. Shadow shield type of whole body counter. (10-1996)
3. Radio-isotope dilution principle & its application. (10-1996)
4. Principles of RIA & IRMA. (10-1996)
5. Different type of collimators used with gamma cameras & their utility in scintigraphy. (10-1996)

6. Computer applications in image processing in NM. (10-1996)
7. RPs for targeting recognition sites. (10-1996)
8. Coronary artery anatomy in relation to MPI. (10-1996)
9. Bayes theorem & its application to medical decision making. (10-1996)
10. Tritium labeling. (10-1996)

1996/I

1. Discuss radiation syndrome (25-1996)
2. Radio-isotope dose calibrators. (15-1996)
3. Maximum permissible radiation dose to occupationally exposed radiation worker and general population at large. (15-1996)
4. Methods of radioactive waste disposal. (15-1996)
5. Genetic effect of radiation. (15-1996)
6. Radiation units. . (15-1996)

1996/II

1. Write in brief the various modalities of treatment available for thyrotoxicosis. Discuss the role of ¹³¹Iodine therapy in magement of thyrotoxicosis(25-1996)
2. QC programme for RPs lab. (15-1996)
3. Tumor seeking RPs. (15-1996)
4. Immunoscintigraphy. (15-1996)
5. Role of NM in GI bleeding disease. (15-1996)
6. Value of ³²P in NM. (15-1996)

1996/III

1. Outline the clinical uses of cardiac RN imaging. (25-1996)
2. Clinical uses of positron emitters. (15-1996)
3. Two sites IRMA. (15-1996)
4. Newer brain scanning agents. . (15-1996)
5. RN studies in renal transplant patients. (15-1996)

6. Sensitivity & specificity of bone scanning. (15-1996)

1996/IV

1. Neutron activation analysis. (10-1996)
2. Cyclotron- produced generator systems. (10-1996)
3. Radio-receptor assay. (10-1996)
4. Attenuation correction in SPECT. (10-1996)
5. Anatomy of lung segments & their relevance to lung scintigraphy. (10-1996)
6. Co-registration of NM images with other images. (10-1996)
7. The concept of “molecular NM”. (10-1996)
8. Deconvolution analysis & its clinical utility. (10-1996)
9. RPs for imaging hypoxia. (10-1996)
10. Principle of PET. (10-1996)

1997/I

1. Discuss the biological effect of the low level radiation with reference to carcinogenesis, teratogenesis & mutagenic changes. (25-1997)
2. Current ICRP recommendations for radiation workers & general population. (15-1997)
3. Radio protector drugs. (15-1997)
4. ALI. (15-1997)
5. Limitations & uncertainties of medical internal radiation (MIRD) committee calculations. (15-1997)
6. Relative biologic effectiveness. (15-1997)

1997/II

1. Discuss NM diagnosis in evaluation of chest pain in a 50 yrs old man. (25-1997)
2. Tumor seeking RPs. (15-1997)
3. Radionuclide evaluation of uncontrolled hypertension. (15-1997)
4. NM diagnosis recurrent UTI. (15-1997)
5. Thyrotoxicosis with decreases RAIU. (15-1997)
6. Comparative merits of hepatobiliary scinti-imaging & USG studies. (15-1997)

1997/III

1. Describe briefly the procedure & adv of RN procedures in diagnosis of various GI diseases (excluding Hepatobiliary & pancreatic disorder). (25-1997)
2. Thyroid auto antibodies. (15-1997)
3. Nero imaging SPECT RPs. (15-1997)
4. Molecular NM. (15-1997)
5. Polycythemia Rubra vera. (15-1997)

1997/IV

1. Radiobiological changes at the cellular level. (10-1997)
2. Radiation protection of personnel handling radioactivity. (10-1997)
3. Collimators used in gamma cameras types & functions. (10-1997)
4. QC of well counter. (10-1997)
5. Filters used in SPECT data processing. (10-1997)
6. Methods of radio-iodination merits & dis adv of each methods
7. Functions & principles of various components of instrumentation used in thyroid uptake measurement. (10-1997)
8. Auto radiography. (10-1997)
9. Decision matrix & its applications. (10-1997)
10. Compartmental analysis. Examples of its applications. (10-1997)

1997/I

1. Discuss the factors which modify radiation injury with specific reference to physical & biological modifiers & the role of sensitizers. (25-1997)
2. Acute radiation syndrome. (15-1997)
3. ALARA. (15-1997)
4. Quality factors. (15-1997)
5. Equilibrium absorbed dose fraction. (15-1997)
6. Dose response models for radiation risk. (15-1997)

1997/II

1. Discuss the mechanism of RPs localizations & variabilities due to pharmacological interventions. (25-1997)
2. Non neoplastic bone scintigraphy. (15-1997)
3. RN evaluation o obstructive uropathy. (15-1997)
4. MIBG in nuclear imaging and therapy. (15-1997)
5. Somatostatin receptor scintigraphy. (15-1997)
6. Dacryoscintigraphy. (15-1997)

1997/III

1. Evaluate the uses of ^{67}Ga in clinical medicine. Give a brief account of its production in India. (25-1997)
2. Aerosol imaging of the lungs. (15-1997)
3. Chernobyl disaster & thyroid cancer. (15-1997)
4. ^{210}Tl in brain imaging (15-1997)
5. Labelling of Leucocytes. (15-1997)
6. Myocardial imaging agents. (15-1997)

1997/IV

1. Emergency preparedness in case of a Nuclear reactor accident. (10-1997)
2. Personal dosimeters(10-1997)
3. Adv in SPECT imaging(10-1997)
4. Counting statistics & its important in NM. (10-1997)
5. What is a decay scheme? Exemplify with Decay scheme of ^{99}Mo - $^{99\text{m}}\text{Tc}$. (10-1997)
6. QC of Gamma camera(10-1997)
7. Interaction of radiation with matter(10-1997)

8. Scintillation detector. (10-1997)
9. Cyclotron(10-1997)
10. Describe the anatomical & physiological features of the respiratory system & the NM technique useful in its evaluation. (10-1997)

May 2005/I

1. Mechanism of Excitation, Ionization, Bremsstrahlung production. (10- May 2005)
2. PET Vs SPECT. (10- May 2005)
3. What is transient equilibrium & secular equilibrium? Give examples. (10- May 2005)
4. Principle of ALARA. (10- May 2005)
5. ICRP recommendation of annual dose limits. (10- May 2005)
6. Define Roentgen, radiation absorbed dose. Gray, radiation weight factor, Sievert. (10- May 2005)
7. What is sensitivity, specificity, accuracy, predictive value? (10- May 2005)
8. LET and its significance. (10- May 2005)
9. Acute and delayed effect of ionization radiation. (10- May 2005)
10. Radiation hormesis & its significance. (10- May 2005)

May 2005/II

1. Rhenium Generator. (10- May 2005)
2. Non-specific assay labels (10- May 2005)
3. Tumor imaging agents (10- May 2005)
4. SPECT analogues of PET agents (10- May 2005)
5. RPs for cardiac metabolism assessment (10- May 2005)
6. Infection imaging agents (10- May 2005)
7. RPs for Renal Transplants (10- May 2005)
8. Radio-isotopes useful for metastatic bone palliation (10- May 2005)
9. Radio-isotopes useful for Radiation synovectomy (10- May 2005)
10. Various RPs used in emergency room with indication(10- May 2005)

May 2005/III

1. Intervention in NM (10- May 2005)
2. Clinical utility of image fusion (10- May 2005)
3. PET in oncology (10- May 2005)
4. Therapy of Hyperthyroidism (10- May 2005)
5. GE function studies(10- May 2005)
6. Renal dynamic scan & its indications (10- May 2005)
7. Functional brain imaging with SPECT (10- May 2005)
8. Clinical utility of Myocardial viability study (10- May 2005)
9. RBC survival & sequestration studies (10- May 2005)
10. Breast cancer & Nuclear technique (10- May 2005)

May 2005/IV

1. A NM lab to be planned for efficient performance of nuclear cardiology practice. Enumerate instruments & accessories needed with main specification (10- May 2005)
2. What are the QC parameters for any counting study with isotopes (10- May 2005)
3. A swipe containing an unknown isotope is given to you. How will you identify what the isotope is with the help of spectrometer? (10- May 2005)
4. What is attenuation? How attenuation correction done in SPECT and PET?
5. What are the daily QC studies for a SPECT? (10- May 2005)
6. How does radiation interact with matter? (10- May 2005)
7. Co-incidence imaging & its adv and pitfalls? (10- May 2005)
8. Different types of Radiation protection measures taken in busy NMD? (10- May 2005)
9. Collimators used in Nuclear cardiac imaging? (10- May 2005)
10. Isotopes calibrators. (10- May 2005)

Dec 2005/I

1. Interaction of radioactive emission from ^{131}I with matter. (10- Dec 2005)
2. Radioactive waste disposal. (10- Dec 2005)
3. Neutron monitor. (10- Dec 2005)

4. ROC curve. (10- Dec 2005)
5. Radio-protectors. (10- Dec 2005)
6. Auto-radiography. (10- Dec 2005)
7. ALALRA. (10- Dec 2005)
8. The concept of Radiation hormeosis. (10- Dec 2005)
9. Apoptosis imaging. (10- Dec 2005)
10. The principle of PET imaging. (10- Dec 2005)

Dec 2005/II

1. Mechanism of localization RPs (10- Dec 2005)
2. Radiotracer for PET (10- Dec 2005)
3. RPs for infection/inflammation imaging (10- Dec 2005)
4. RPs for Myocardial viability evaluation (10- Dec 2005)
5. Principle of Radionuclide generators. Describe transient & secular equilibrium(10- Dec 2005)
6. RPs helpful in the evaluation of patients of road traffic accidents. (10- Dec 2005)
7. P-32 in NM(10- Dec 2005)
8. Methods of RN production (10- Dec 2005)
9. Methods of Cr-51 labeling of RBC & causes of poor labeling. (10- Dec 2005)
10. Tumor seeking RPs in routine Gamma camera imaging (10- Dec 2005)

Dec 2005/III

1. Evaluation of hydrocephalus (10- Dec 2005)
2. Thyroid stunning(10- Dec 2005)
3. Enumerate the criteria for evaluating pulmonary embolism (10- Dec 2005)
4. RN imaging of pancreas (10- Dec 2005)
5. Pharmacological stress MPI. (10- Dec 2005)
6. RN intervention in biliary tract (10- Dec 2005)
7. Discuss & role of radiosynovectomy in crippling arthritis. (10- Dec 2005)
8. Causes of intraosseus MDP uptake in bone scanning. (10- Dec 2005)
9. Radio-immuno therapy(10- Dec 2005)
10. Role of RN in bone palliation. (10- Dec 2005)

Dec 2005/IV

1. Thyroid uptake study with reference to hyperthyroidism (10- Dec 2005)
2. Significance of attenuation correction for PET (10- Dec 2005)
3. Statistical error in radioactive counting. (10- Dec 2005)
4. Absorb dose, equivalent dose, and effective dose. (10- Dec 2005)
5. Compare properties of phytate & sulphur colloid. (10- Dec 2005)
6. TLD personal monitoring. (10- Dec 2005)
7. Annihilation Radiation(10- Dec 2005)
8. Radioactive waste disposal (10- Dec 2005)
9. Quality assurance of PET RPs (10- Dec 2005)
10. Artificial production of RN. (10- Dec 2005)

2004/I

1. Compare and contrast biological effect of alpha, beta, & gamma rays. Give suitable examples. (25- 2004)
2. Neutron monitors and its use (10- 2004)
3. oxygen enhancement ratio(10- 2004)
4. Personal monitoring (10- 2004)
5. ALARA (10- 2004)
6. Radiation waste disposal(10- 2004)

2004/II

1. What is the ideal RPs? Discuss the various QC measures used in RP lab? (25- 2004)
2. ^{18}F -FDG (15- 2004)
3. Drugs & RPs distribution(15- 2004)
4. RPs for thrombus imaging(15- 2004)
5. Compare & contrast ^{201}Tl & $^{99\text{m}}\text{Tc}$ -labelled MPI agents. (15- 2004)
6. Radio-labelled colloid & its uses. (15- 2004)

2004/III

1. Discuss the role of nuclear technique in the evaluation of a diabetic (25- 2004)
2. Radio-immunoscintigraphy (15- 2004)

3. Hepato-biliary scintigraphy(15- 2004)
4. Radiation synovectomy (15- 2004)
5. Whole body iodine 131I scan (15- 2004)
6. Parathyroid imaging (15- 2004)

2004/IV

1. What are types of detectors used in nuclear imaging? Discuss their characteristics, merits & demerits. (25- 2004)
2. Fusion imaging (15- 2004)
3. Attenuation correction. How frequently it is required. (15- 2004)
4. LET, half value layer, & effective half life. (15- 2004)
5. Cyclotron produced RPs. (15- 2004)
6. Alpha emitter & their uses. (15- 2004)

2002/I

1. Describe the mechanism of Radio-sensitizer & discuss their clinical application. (25- 2002)
2. RBE (10- 2002)
3. Effective dose (10- 2002)
4. Critical organ (10- 2002)
5. Uniformity(10- 2002)
6. Intrinsic resolution (10- 2002)

2002/II

1. Iodine metabolism (10- 2002)
2. Radiolebelled MIBG in nuclear imaging & therapy (10- 2002)
3. Role of Radionuclide in bone palliation (10- 2002)
4. Role of NM study in renal transplant (10- 2002)
5. 18F-FDG imaging- principle & role in clinical application (10- 2002)
6. Role of Radio-labelled monoclonal Ab as therapeutic agents. (10- 2002)
7. QC programme of RP lab (10- 2002)
8. Pulmonary embolism & NM (10- 2002)

9. ELISA (10- 2002)
10. TSH estimation by IRMA method (10- 2002)

2002/III

1. Sentinel imaging (10- 2002)
2. Radionuclide treatment of neural crest tumor (10- 2002)
3. Isotopic diagnosis of viable myocardium. (10- 2002)
4. Thyrotoxicosis with low thyroid radio-iodine uptake. (10- 2002)
5. Pitfall in diuretic renography. (10- 2002)
6. Infection imaging (10- 2002)
7. Non artherosclerotic causes of myocardial perfusion effects. (10- 2002)
8. RN imaging studies in Epilepsy. (10- 2002)
9. RN studies for evaluation of GI bleeding. (10- 2002)
10. Interpretation of myocardial perfusion gated SPECT studies. (10- 2002)

2002/IV

1. Write an essay on PET imaging with reference to choice of isotope for Nuclear cardiology. (25- 2002)
2. Health physics monitoring of NM workers. (10- 2002)
3. QC of SPECT. (10- 2002)
4. LET. (10- 2002)
5. Coronary artery- applied anatomy in NM practice. (10- 2002)
6. Gaussian & Poisson distribution. (10- 2002)

1989/II

1. Discuss the RN techniques in the evaluation of the renal system (25- 1989)

2. Principles of RIA. What are the variants of RIA? Merits/demerits of RIA. RIA Vs ELISA. (10-1989)
3. Describe procedure of extraction of ^{99m}Tc from ^{99}Mo generator supplied by BARC. Describe briefly the QC on ^{99m}Tc . (10- 1989)
4. Discuss technique used in the evaluation of non metastatic skeletal disorder. (10- 1989)
5. Discuss technique used in the evaluation of jaundice. What are the mechanisms of localization? (10-1989)
6. Discuss technique of spleen scan. (10- 1989)
What are the indications for spleen scan? Describe the technique of preparation of Cr-51 RBC for spleen scan.

1989/I

1. Discuss the stochastic & non- stochastic effect of ionization radiations. What is the relevance in Radiation protection? (25- 1989)
2. ALI. (10- 1989)
3. Effects on haemopoietic system after acute radiation exposure to whole body. (10- 1989)
4. Adv of using ^{99m}Tc RPs in NM from radiation protection point of view. (10- 1989)
5. Maximum permissible dose to occupationally exposed radiation worker. (10- 1989)
6. Various sources of Radiation exposure. (10- 1989)

1989/IV

1. What is the basic unit of radio-activity? Define Radio-active decay. Describe in details, various processes of radioactive decay with examples. What do you understand by the terms probability of decay & half life? (25- 1989)
2. Compton effect (10- 1989)
3. Principle of PET (10- 1989)
4. Scintillation detector. (10- 1989)
5. General considerations in quality assurance of RPs. (10- 1989)
6. Basic principle & essential features of a Nuclear generator(10- 1989)

1989/I

1. Describe briefly the various modalities of the treatment of Polycythemia Vera & discuss the role of P-32 in its managements. (25- 1989)
2. Role of Nuclear cardiology in IHD & infarct managements. (10- 1989)
3. Medullary Ca thyroid. (10- 1989)
4. Role of NM procedures in staging of malignant disorder. (10- 1989)
5. Bone densitometer study. (10- 1989)
6. Adrenal imaging. (10- 1989)

2007/I

1. Method to obtain beta dosimeter of RN (10- 2007)
2. Relation between CET & RBE & its relevance(10- 2007)
3. Dose limit prescribe by AERB and ICRP(10- 2007)
4. Biological effect of Radiation(10- 2007)
5. Describe in details the method to ascertain critical organ of a new RPs. (10- 2007)
6. Dose response curve. (10- 2007)
7. Factors affecting the outcome of any radiation therapy. (10- 2007)
8. Monitoring and preventive practices in a PET-cyclotron facility for radiation exposure. (10- 2007)
9. Radio-protector- examples, mode of action & their application. (10- 2007)
10. Radio-sensitizer- examples, mode of action & their application. (10- 2007)

2007/II

1. Mechanism of localization of RPs. (10- 2007)
2. Generator produced RN. (10- 2007)
3. Physical properties of ^{99m}Tc . (10- 2007)
4. RN used in therapy of tumor. (10- 2007)
5. Iodination of proteins. (10- 2007)
6. Labelling methods of RBCs. (10- 2007)
7. QC of RPs. (10- 2007)
8. Production of ^{18}F FDG. (10- 2007)
9. Preparation of ^{99m}Tc -Sestamibi. (10- 2007)
10. Anatomy & physiology of kidneys. (10- 2007)

2007/III

1. Indications of Bone scan. (10- 2007)
2. Flare phenomenon. (10- 2007)
3. Hyper-parathyroidism- 99mTc-sestamibi imaging. (10- 2007)
4. Cerebral perfusion SPECT study – procedure for 99mTc HMPAO & ECD. (10- 2007)
5. Drugs causing decreased uptake of radioactive iodine in thyroid glands. (10- 2007)
6. Principle of PET imaging with FDG. (10- 2007)
7. MPI with 99mTc-MIBI SPECT acquisition & reconstruction parameter. (10- 2007)
8. Modified PLOPED criteria for pulmonary embolism diagnosis- high & intermediate probability. (10- 2007)
9. 99mTc-RBCs scan for GI bleeding protocol. (10- 2007)
10. Dynamic Renal scintigraphy with 99mTc-DTPA & GFR. (10- 2007)

2007/IV

1. Working of Nuclear reactor. (10- 2007)
2. Types of distribution & its relevance in statistical analysis. (10- 2007)
3. Chi-square test. (10- 2007)
4. Types of collimator & their characteristics. (10- 2007)
5. Practical utility of various types of radiation detector devices used in NM. (10- 2007)
6. Interaction radiations with matter- give examples of each type in practice. (10- 2007)
7. Waste management in NMD. (10- 2007)
8. How would you plan management of nuclear accident in reactor as a NM physician? (10- 2007)
9. Salient criteria in selecting a work station for NMD. (10- 2007)
10. Types of PET detectors- their merits & limitations. (10- 2007)

1990/I

1. Discuss Radiation Syndrome. (25- 1990)
2. Isotope effect. (10- 1990)
3. Radioactive tracer & indicators. (10- 1990)
4. Relative radio-sensitivity. (10- 1990)

5. Radio-isotope dose calibrator. (10- 1990)

1990/II

1. Describe the clinical usefulness of a RN bone scan. Briefly outline its Limitation. Mention the conditions producing cold spot in a bone scan. (25- 1990)
2. Radio-labelled monoclonal Ab. (15- 1990)
3. Enumerate modes of production of RN. Name important RN in each mode of production. (15- 1990)
4. RN evaluation of GI bleeding. (15- 1990)
5. MUGA scan. (15- 1990)
6. Computers in NM. (15- 1990)

1990/I

1. Enumerate the type of ionization radiation of biological importance. Describe briefly the radiation effect at molecular level of the cell such as DNA, enzyme & lipid composing cell membrane & their possible cellular effect. Give a brief account of Relative tissue radio sensitivity in the human being. (25- 1990)
2. Maximum permissible radiation dose to occupationally exposed radiation worker & general population at large. (15- 1990)
3. Radiation protection problem arising from patients treated for cancer thyroid with ^{131}I . (15- 1990)
4. Genetic effect of Radiation. (15- 1990)
5. Principle of functioning ionization chamber & its application in NM. (15- 1990)
6. Acute radiation syndrome. (15- 1990)

1990/III

1. How will you proceed to investigate a young hypersensitive patient with the aid of RN investigation. (25- 1990)
2. RN study of Lung. (15- 1990)
3. ELISA & RIA- Merits & demerits. (15- 1990)
4. T3 Toxicosis. (15- 1990)
5. Computers in NM. (15- 1990)
6. RN study in DVT. (15- 1990)

1990/II

1. Describe the role of NM in oncology with special mention on recent trends. (25- 1990)
2. Cyclotron produced RN. (15- 1990)
3. QC programme foe RPs lab. (15- 1990)
4. Renal transplant evaluation by RN study. (15- 1990)
5. Hepatobiliary imaging. (15- 1990)
6. Radio-iodine therapy for thyrotoxicosis. (15- 1990)

1991/II

1. Discuss the recent advance in Nuclear technology in the evaluation of coronary artery disease. (25- 1991)
2. Briefly mention physical characteristics & mode of production of ^{67}Ga & its application in scintigraphy in non-maliganant. (15- 1991)
3. RN imaging in the diagnosis of Lymphocele . (15- 1991)
4. Nuclear technology in diagnosis of duodeno-gastric reflux. (15- 1991)
5. Immunoscintigraphy. (15- 1991)
6. RN in the management of medullary Ca thyroid. (15- 1991)

1991/I

1. Describe the various types of interaction of radiation with matter. Enumerate the effects of ionization radiations at cellular level & describe relative radio-sensitivity of mammalian cells. (25- 1991)
2. Current philosophy of radiation protection, including recommendations of the international commission of radiation protection (ICRP). (15- 1991)
3. Factors influencing the counting of radioactivity. (15- 1991)
4. Radiation units. (15- 1991)
5. Genetic effect caused by ionizing radiation. (15- 1991)
6. Components of Rectilinear scanner. (15- 1991)

1991/I

1. Describe the various aspect of compartmental analysis. Give examples of at least two compartmental models with full description. Describe the role of computers in developing such models & in compartmental analysis. (25- 1991)
2. Radiation detector system. (15- 1991)
3. Statistically consideration in counting radioactivity. (15- 1991)
4. Principles of scintillation cameras. (15- 1991)
5. Effects of radiation on developing embryo & fetus. (15- 1991)
6. Generators for producing RN. (15- 1991)

1991/II

1. Give an account four PET RN produced by parents-daughter generator system. Describe their physical characteristics, half life, Average energy of the daughter per disintegration & their potential in clinical applications. (25- 1991)
2. ^{210}Tl myocardial imaging in CAD. (15- 1991)
3. GE scintigraphy (mention the clinical indications & other modalities used in the diagnosis). (15- 1991)
4. RN in the Rx of bone secondaries & hepatocellular Ca. (15- 1991)
5. RN for regional cerebral blood flow study. (15- 1991)
6. Infarct & scintigraphy in acute & subacute MI. (15- 1991)

1991/IV

1. Critically enumerate the components of emergency preparedness to deal with the health effect of radiation accidents. (25- 1991)
2. ^{131}I decay with half life of 8.05 days. Find out the probability of the disintegration of one atom of ^{131}I in one second. (15- 1991)
3. Effective half life. (15- 1991)
4. Radio-active equilibrium. (15- 1991)
5. TLD. (15- 1991)
6. Blood Brain Barrier. (15- 1991)

1991/IV

1. Describe the procedures involved in handling of cadavers with incorporated RN, with special reference to the rules & regulation governing their storage, embalming, burial, & autopsy. (25- 1991)
2. A dose of I-131 for a patient has to have an activity of 1 mCi at 18.00hrs on 22nd nov. The stock bottle states the activity is 3 mCi at 12.00hrs on 21st nov & that the activity is in 5 ml of solution. What volume of solution must be withdrawn from the bottle to give the correct activity for administration to patient? (15- 1991)
3. Number of requests for renal scans in a NMD over a period of 10 consecutive months was 400, 375, 420, 450, 410, 390, 470, 425, 385, & 440. Over this period a normal distribution may be assumed. The next month a new gamma camera was installed & the number request rose to 510. Does this increase represent significant increase? (15- 1991)
4. Flat field collimator. (15- 1991)
5. PMT(15- 1991)
6. Iodine 123(15- 1991)

1992/III

1. Mr "A" 30 yrs old reported to you a solitary thyroid nodule of 6 months. How will you investigate the case? Describe the management of a case mixed Papillary & Follicular Ca thyroid. (25- 1992)
2. RN studies on AIDS (15- 1992)
3. Radio Immunosintigraphy. (15- 1992)
4. Renography & its modifications. (15- 1992)
5. PET Brain imaging. (15- 1992)
6. Myocardial imaging agents. (15- 1992)

1992/I

1. Discuss the events occur when alpha, beta, & gamma interact with matter & describe how these have been used to advantage in development of radiation detection & imaging system. (25- 1992)
2. Positron technique in SPECT imaging (15- 1992)
3. Institutional storage & disposal of radioactivity (15- 1992)
4. Stochastic & non- stochastic effect of radiation (15- 1992)

5. TLD. (15- 1992)
6. Radiosensitizer. (15- 1992)

1992/III

1. Mrs “M” 35 yrs old mother of two children is loosing weight continuously for the last 3 months. How will you investigate her? (25- 1992)
2. RN approach to case of PUO (15- 1992)
3. RIA(15- 1992)
4. Radio-isotopic evaluation of hepatic SOL (15- 1992)
5. RN investigations of GI bleeding (15- 1992)
6. MUGA in CAD (15- 1992)

1992/IV

1. Describe the underlying principles of functioning of a SPECT Gamma camera. Describe various parameters used in reconstruction of data. (25- 1992)
2. Instrument QC in RIA (15- 1992)
3. Dosimeter (15- 1992)
4. Interaction radiation with matter (15- 1992)
5. Half life (15- 1992)
6. Spectrometer (15- 1992)

1992/II

1. What are the various NM procedures? Where pharmacological intervention is performed & describes one of the procedures in detail mentioning the concept, pitfall and utility. (25- 1992)
2. Radiolabelling of RBCs for diagnosis of hematological disorder(15- 1992)
3. RN imaging of parathyroid glands(15- 1992)
4. Extra-myocardial applications of Thallium-201 isotope (15- 1992)
5. The variation in Bone scan quality using the same RPs(15- 1992)
6. Probe Renography (15- 1992)

1992/IV

1. Detection & decontamination of low level Gamma, beta contamination. (10- 1992)
2. Cyclotrons (10- 1992)
3. Binominal, Gaussian & Poission distribution. (10- 1992)
4. GM counters(10- 1992)
5. Characteristic X-rays (10- 1992)
6. Collimators in Gamma cameras (10- 1992)
7. QC in Gamma camera (10- 1992)
8. SI units of Radiations.
9. PMT (10- 1992)
10. What is the decay scheme? Exemplified with decay scheme of ^{99}Mo - $^{99\text{m}}\text{Tc}$

1992/I

1. Define the term critical organ. Describe the various factors involved in calculating radiation dose to organs from internally administered RN with special reference to the MIRD method. List the uncertainties & limitation of such dosimetric calculations. (25- 1992)
2. Design of Hospital Radio pharmacy (15- 1992)
3. NM computers(15- 1992)
4. Liquid scintillation counting (15- 1992)
5. Radioactive decontamination. (15- 1992)
6. Acute Radiation Syndrome (15- 1992)

1992/I

1. Discuss the QC of various technetiums labelled RPs. Illustrate with examples. (25- 1992)
2. Technique of imaging Meckles Diverticulam (15- 1992)
3. The technique of aerosol ventilation technique (15- 1992)
4. Adenosine Thallium Myocardial scintigraphy (15- 1992)
5. Captopril Renography (15- 1992)
6. ^{131}I MIBG scintigraphy (15- 1992)

1993/IV

1. Discuss the statistic of counting radiation. (25- 1993)
2. Radiation Casualties (15- 1993)
3. GM counters (15- 1993)
4. Radioprotectors (15- 1993)
5. Chi square test (15- 1993)
6. Data storage devices (15- 1993)

1993/III

1. Discuss the immunopathology & management of Graves' infiltrative ophthalmopathy. (25- 1993)
2. AIDS evaluation through use of RN imaging (15- 1993)
3. Somatostatin scintigraphy (15- 1993)
4. Radionuclide evaluation of Renal transplant rejection (15- 1993)
5. RN imaging in pulmonary thrombo-embolism in patients of obstructive pulmonary disorder(15- 1993)
6. RN evaluation of myocardial viability in IHD (15- 1993)

1993/I

1. Discuss the different methods of radio-iodination of proteins, peptides & haptans. Give critical comments on selection of suitable isotope for labelling. Iodination damage, stability of iodinated compounds & radiation safety measures you would take during iodination. (25- 1993)
2. Radio-sensitivity & cell cycles (15- 1993)
3. Radiation induced chromosomal aberration (15- 1993)
4. ALI (15- 1993)
5. Radiological prospect of using short lived RN in therapy (15- 1993)
6. Limitation of MIRD calculation (15- 1993)

1993/I

1. Discuss the principle of RIA & its variants. What QC methods will you follow periodically to assess the reliability of RIA kit? (15- 1993)
2. Radio-respirometer (15- 1993)
3. Bio-distribution of RPs(15- 1993)

4. NM technique in endocrine disease (15- 1993)
5. Testicular imaging with RN (15- 1993)
6. GFR estimation using radionuclide technique (15- 1993)

1995/III

1. Discuss in detail isotopic therapy in thyrotoxicosis? (15- 1993)
2. Pulmonary embolism diagnosis (15- 1993)
3. Discuss briefly the methods available for measurement of
 - a. TSH
 - b. Free T4
4. How would you interpret these result in the clinical practice (15- 1993)
5. Recent advances in NM procedure to study coronary blood flow (15- 1993)
6. Discuss etiology, clinical manifestation & investigations of salient thyroiditis (15- 1993)