Post Graduate Medical Diploma (Part-I)

Diploma in Medical Radiology - Therapetuics (DMRT)

Paper-I

(Multiple Choice Questions)

MODEL PAPER

Signatures of Candidate

Roll No.

Total Marks: 100
Time Allowed: 2 hours

Instructions:

i. Read the instructions on the MCQ Response Form carefully.
ii. Attempt ***all*** questions.
iii. Question Paper to be returned along with MCQ Response Form.
iv. Candidates are strictly prohibited to give any identification mark except Roll No. & Signatures in the specified column only.

Q.1 Select the appropriate thickness of a lead cut out for the treatment with 18MeV electrons:

a) 1.0 cm.
b) 1.5 cm.
c) 1.2 cm.
d) 0.9 cm.
e) 2.0 cm.

Q.2 Regarding photon beam therapy, increasing SSD is related to:

a) Decreased D max.
b) Increased back scatter.
c) Decreased field size.
d) Increased depth dose curves.
e) Increased side scatter.

Q.3 For kilovoltage energy beams, how would you improve the efficiency of beam with beam hardening:

a) Cones.
b) Compensators.
c) Filters.
d) Lipowitz material.
e) Lead shields.

Q.4 Unit of exposure is:

a) Rad.
b) Rem
c) Roentgen
d) Curie.
e) Sievert.

Q.5 Cobalt-60 emits:

a) only Gamma rays
b) Beta and Gamma rays
c) X-rays
d) Alpha & Gamma rays.
e) β-rays.

Q.6 Half life of cobalt-60 is:

a) 5.50 years
b) 5.56 years
c) 5.26 years
d) 5.63 years
e) 7.51 years.

Q.7 Target angle that is usually used in radio therapy x-ray tube is:

a) 10°
b) 20°
c) 30°
d) 50°
e) 45°

Q.8 Device used to evaluate the film badge is:

a) Developer
b) Densitometer
c) Spectrometer
d) Charger+Reader
e) Dosimeter.

Q.9 Attenuation of radiation means:

a) Reduction in radiation intensity
b) Reduction of radiation energy
c) Increase of radiation intensity
d) Increase of radiation energy.
e) Loss of radiation energy.

Q.10 Source of (parent) of Tc^{99m} is:

a) Cobalt 99
b) Nickle 99
c) Cesium 137
d) Molybedinum 99
e) Radium.

(Continued)

Q.11 Cobalt-60 emits photons of:

a) 1.17 MeV and 1.33 MeV
b) 1.25 MeV and 1.35 MeV
c) 1.07 MeV and 1.02 MeV
d) 2.64 MeV and 2.35 MeV
e) 1.19 MeV and 1.25 MeV.

Q.12 Value of p is:

a) 22/9
b) 22/7
c) 26/7
d) 20/9
e) 22/7.5

Q.13 Frequency means number of:

a) Radiation passing through a point per unit time.
b) Cycles passing through a point per unit time.
c) Radiation passing through a point per unit area.
d) Cycles passing through a point per unit area.
e) Radiation passing through a pin hole.

Q.14 Hinge angle in radio therapy is angle:

a) Of wedge filter when applied to the tumor.
b) Of the radiation beam with respect to the vertical position of beam.
c) Between two radiation beams in the centre of tumor.
d) Of breast tangentional fields.
e) Between tangential fields.

Q.15 Velocity of light is:

a) 3×10^8 m/sec
b) 3×10^8 cm/sec
c) 3×10^9 m/sec
d) 3×10^9 cm/sec
e) 3×10^{10} cm/sec.

Q.16 Factors affecting radiation protection:

a) Shielding
b) Beam Blocks
c) Wedge filters
d) Beam energy
e) Machine.

Q.17 Annual radiation limit for radiation worker now-a-days is:

a) 5 rems
b) 3 rems
c) 4 rems
d) 2 rems
e) 1.5 rems

Q.18 Physical state of radon is:

a) Solid
b) Liquid
c) Gas
d) Metallic
e) Liquid and gas

Q.19 Thermionic-emission means emission of:

a) Neutron by heat from nucleus
b) Beta particle by heat from surface of metal
c) Electron from surface of metal
d) Positrons from the surface of metal.
e) Protons.

Q.20 TVL is:

a) Thickness value of layer
b) Thickness of layer which reduces the beam to $1/10^{th}$ of original value
c) TVL is same as HVL
d) TVL is the close circuit TV monitor.
e) Thickness of layer which reduces the beam to $1/5^{th}$ of original value.

Q.21 Curative dose of radiation for larynx is:

a) 30-40 Gy
b) < 40 Gy
c) 60-70 Gy
d) > 80 Gy
e) 20 Gy only

Q.22 The radiation induced cell damage is due to:

a) Hypoxia
b) Injury to mitochondria
c) Cell splitting
d) Damage to DNA
e) Cell membrane breakage.

Q.23 The oncogenes are capable of inducing:

a) Mitosis of the cells.
b) Cancer of the cells.
c) Cell mutation.
d) Hypersensitivity reaction
e) Cell death.

Q.24 A proton beam therapy has been used for a right parietal lobe GBM. Identify radiobiological principle involving this therapy:

a) Indirect action.
b) Direct action.
c) Photoelectric effect.
d) Pair production.
e) Characteristic radiation.

Q.25 In a linear quadratic cell survival curve, what does the shoulder indicate:

a) Increased survival.
b) Chromosomal repair.
c) Lethal damage repair.
d) Sub lethal damage repair.
e) Chromatid aberration.

Q.26 A 45 year old male has presented to you with right sided pleomorphic adenoma. He has been started on post operative radiotherapy. After fifth day of radiotherapy he develops a red hot painful right angle of jaw swelling. What is your preliminary diagnosis:

a) Tumor progression.
b) Otitis media.
c) Otitis externa.
d) Acute parotitis.
e) Acute myositis.

Q.27 Regarding electromagnetic radiations, as LET increases, OER:

a) Increases.
b) Remain stable.
c) Decreases.
d) No effect.
e) None of the above.

Q.28 A nuclear plant worker has been exposed to 12 Gy of whole body radiation. He will suffer from:

a) CNS toxicity.
b) CNS + GI + Bone marrow toxicity.
c) GI toxicity.
d) GI + Bone marrow toxicity.
e) Bone marrow toxicity.

Q.29 Which is the best available radiotherapy modality for treatment of Head & Neck cancers as far as salivary gland toxicity is concerned:

a) Co-60.
b) High-energy photons.
c) Proton beam therapy.
d) Electron therapy.
e) IMRT.

Q.30 A 45 year old singer has been diagnosed with T2N0M0 carcinoma larynx. What does current evidence suggest regarding the use of daily fraction size for carcinoma larynx:

a) < 2 Gy.
b) > 2 Gy.
c) > 2.5 Gy.
d) 1.8 Gy.
e) 1.6 Gy.

Q.31 M phase in a cell cycle denotes:

a) Mitosis.
b) Meiosis.
c) Mutagenesis.
d) Malignant.
e) Mature.

Q.32 A 24 y/f has to be planned for radical radiotherapy of her maxillary tumor. After what dose of radiotherapy you expect the chances of optic retinopathy to rise:

a) > 60 Gy
b) > 50 Gy
c) > 45 Gy
d) > 40 Gy
e) > 54 Gy

Q.33 Using hyperfractination schedules in certain malignancies, late normal tissue reactions / toxicities are:

a) < conventional fractionations.
b) Same as conventional fractionations.
c) > Conventional fractionations.
d) Not a common happening.
e) None of the above.

Q.34 The reason for S phase of cell cycle exhibiting radio resistance is due to:

a) Cyclin D1 pathway.
b) Ineffective repair mechanisms.
c) Hypoxic cell cycle phase.
d) Increased homologous recombination of chromosomes.
e) All of the above.

Q.35 Multiple fractions per day can be given as far apart but not closer than:

a) 4 hours.
b) 6 hours.
c) 8 hours.
d) 10 hours.
e) 5 hours.

Q.36 Which one of these is the primary dose limiting organ in the radiotherapy management of right renal cell carcinoma:

a) Kidney.
b) Pancreas.
c) Spinal cord.
d) Small bowel.
e) Liver.

(Continued)

Q.37 Radiotherapy dose escalation has shown significant benefit in:

a) Ca Pancreas.
b) GBM.
c) Medulloblastoma.
d) Ca prostate.
e) Ca bladder.

Q.38 Which chemotherapy has an established role as a radiosensitizer for the treatment of carcinoma lung:

a) Capecitabine.
b) 5FU.
c) Docetaxel.
d) Cisplatin.
e) Vincristine.

Q.39 At what dose of radiotherapy, irreversible hair loss occurs:

a) 50Gy.
b) 45Gy.
c) 70Gy.
d) 30Gy.
e) 40Gy.

Q.40 Retina can tolerate upto what dose of radiotherapy without complications :

a) 40Gy.
b) 30Gy.
c) 50Gy.
d) 60Gy.
e) 70Gy.

Q.41 In a young adult of 20 years age, the red bone marrow is present mainly in:

a) Humerus, tibia and fibula.
b) Humerus and tibia.
c) Tibia, fibula and femur.
d) Tibia and fibula.
e) Vertebrae, sternum, ribs and ilia.

Q.42 Red cell production is regulated by:

a) Folic acid.
b) Erythropoietin.
c) Iron.
d) Pyridoxine.
e) Vitamin B_{12}.

Q.43 A middle aged man presents with fracture of femur. He also gives history of pain in the lumbar region. X-rays of various bones show punched out areas. Abdominal ultrasound indicates bilateral renal stones. His plasma calcium level is 14mg/dl. The man is most likely to have:

a) Calcitonin secreting tumour.
b) Hyperparathyroidism.
c) Hypoparathyroidism.
d) Osteomalacia.
e) Rickets.

Q.44 The percentage of the plasma calcium present as ionized calcium is:

a) 10%
b) 20%
c) 30%
d) 40%
e) 50%

Q.45 The parathyroid hormone:

a) Causes phosphate reabsorption in renal tubules.
b) Decreases calcium excretion in the urine.
c) Increases deposition of calcium in bones.
d) Inhibits calcium absorption from the intestine.
e) Stimulates osteoblasts in the bones.

Q.46 Osteoclasts in bones are activated by:

a) Calcitonin.
b) Cortisol.
c) Estrogen.
d) Parathyroid hormone.
e) Testosterone.

Q.47 The endocrinal functions of kidneys do not include:

a) Conversions of cholecalciferol into 1-hydroxycholecalciferol.
b) Conversion of 1-hydroxycholecalciferol into 1:25 dihydroxycholecalciferol.
c) Secretion of prostaglandins.
d) Secretion of rennin.
e) Secretion of erythropoietin.

Q.48 Glucocorticoids are administered orally to a patient. His blood picture is likely to show decreased number of:

a) Lymphocytes.
b) Monocytes.
c) Neutrophils.
d) Platelets.
e) Red blood cells.

(Continued)

Q.49 Ketone bodies are formed in excess when there is deficiency of:
a) Cortisol.
b) Glucagon.
c) Growth hormone.
d) Insulin.
e) Thyroxine.

Q.50 During the fetal life, development of the brain is promoted by mainly:
a) Cortisol.
b) Insulin.
c) Growth hormone.
d) Parathyroid hormone.
e) Thyroid hormones.

Q.51 Insulin increases:
a) Gluconeogenesis.
b) Ketogenesis.
c) Lipolysis.
d) Protein synthesis.
e) Protein catabolism.

Q.52 Inhibition of the bone resorption is:
a) By calcitonin.
b) Called osteoporosis.
c) Due to osteoblastic acitivity.
d) Present in osteomalacia.
e) Present in rickets.

Q.53 Aldosterone secretion is stimulated by increased plasma concentration of:
a) Calcium.
b) Chloride.
c) Magnesium.
d) Potassium.
e) Sodium.

Q.54 If vanillyl mandelic acid is found in high concentration in the urine, it is most likely to be due to tumor involving:
a) Adrenal cortex.
b) Adrenal medulla.
c) Anterior pituitary.
d) Pancreas.
e) Thyroid gland.

Q.55 Plasma ionic calcium level becomes low in:
a) Acidosis.
b) Alkalosis.
c) Decreased secretion of calcitonin.
d) Excess of vitamin D in the body.
e) Hyperparathyroidism.

Q.56 Which of the following is a synthetic reaction in Biotransformation?
a) Oxidation.
b) Reduction.
c) Hydrolysis.
d) Acetylation.
e) De-amination.

Q.57 The mechanism of action of Carbamazepine as anti-seizures drug is:
a) Block of sodium ion channels.
b) Block of calcium ion channels.
c) Facilitation of GABA actions on chloride ion channels.
d) Glutamate receptor antagonism.
e) Inhibition of GABA transaminase.

Q.58 In an experimental model, Methotrexate's levels were reduced to 50% in relation to its initial maximum levels after about 7 hours. Its steady state levels can be measured after:
a) 14 hours.
b) 20 hours.
c) 28 hours.
d) 49 hours.
e) 60 hours.

Q.59 A variation in response of a drug in a given population can best be described by:
a) Drug potency.
b) Maximum efficacy.
c) Therapeutic index.
d) Graded dose-response curve.
e) Quantal dose-response curve.

Q.60 A 40 year old patient with breast cancer is receiving doxorubicin. Which of the following drugs can reduce the systemic levels of Doxorubicin?
a) Phenobarbitone.
b) Isoniazid.
c) Propranolol.
d) Phenytoin.
e) Cyclosporine.

Q.61 The possible anti-mitotic dose may be reduced to 0% (i.e., stopped) if granulocyte count becomes:
a) 3000.
b) 2500.
c) 2000.
d) 1500.
e) <1000.

(Continued)

Q.62 Regarding tamoxifen, the best term describing it is:

a) Full agonist.
b) Partial agonist.
c) Pharmacological antagonist.
d) Physiological antagonist.
e) Inverse agonist.

Q.63 A cell-cycle specific anticancer drug that acts mainly in the M-phase of the cell cycle is:

a) Cisplatin.
b) Bleomycin.
c) Paclitaxel.
d) Etoposide.
e) Methotrexate.

Q.64 One of the following anticancer groups which is cell cycle specific also useful in Hodgkin's lymphomas:

a) Antibiotics.
b) Antimetabolites.
c) Alkylating agents.
d) Glucocorticoids.
e) Plant alkaloids.

Q.65 A 40 year old patient is on Methotrexate for her metastatic choriocarcinoma. It is important to maintain a high urinary pH 6.5 because:

a) It causes bladder irritation.
b) It is a weak acid.
c) It is a weak base.
d) Leucovorin toxicity is to be reduced.
e) Purine-reabsorption occurs at this pH.

Q.66 A 35 year old male patient is receiving a combination therapy for his testicular carcinoma. Being his compromised-renal functions, which one of the following drugs must be avoided for threatened nephrotoxicity?

a) Bleomycin.
b) Vinblastin.
c) Cisplatin.
d) Etoposide.
e) Leuprolide.

Q.67 In cancer chemotherapy Allopurinol is being used adjunctively to offset hyperuricemia. The dose of which drug should be reduced to 25% of normal:

a) Bleomycin.
b) Fluorauracil.
c) Methotrexate.
d) Mercaptopurine.
e) Vincristine.

Q.68 In Phase III trials the aim is to explore spectrum of beneficial and toxic effects of a new drug than the older therapies and is carried out:

a) In 100-300 patients.
b) In a double blind design.
c) At a single center.
d) By a group of clinicians at the same center.
e) Without placebo.

Q.69 A 20 year old lady suffering from metastatic carcinoma is receiving a combination of chemotherapy. She threatens to stop her treatment because of "severe" nausea and vomiting. Which of the following regimen will prevent emesis upto 90%.:

a) Combination of ondansetron and granisetron.
b) Ondansetron and droperidol.
c) Ondansetron, dexamethasone and droperidol.
d) Ondansetron, dexamethasone and aprepitant.
e) Metoclopramide and droperidol.

Q.70 Morphine may be used in:

a) Adrenal insufficiency.
b) Biliary tract surgery.
c) Hypothyroidism.
d) Late stage of labour.
e) Pulmonary oedema.

Q.71 George Engel put forward the concept of Biopsychosocial perspective of health and disease which stresses on the understanding of :

a) Holistic medicine.
b) Social milieu of the patient.
c) Better communication skills.
d) Personality of the patient
e) Psychosocial environment of patient in the same way as pathophysiological processes.

Q.72 While the physician is expected to know the patient's language, the patient is often unaware of the medical jargon. Therefore :

a) The responsibility lies with the physician to bridge the communication gap
b) The physician must first simplify and explain the medical terminology.
c) The physician must explore the psychosocial background of each patient.
d) Medical jargon must be banned.
e) The physician must learn other languages.

Q.73 Active listening is a complex process which involves a simultaneous focus on patient's words as well as :

a) Body language.
b) Paralinguistic aspects
c) Active prompting
d) Adequate eye contact.
e) Open ended questions.

Q.74 Empathy building refers to the statements of the doctor that :

a) Conveys to the patient that his feelings have been well-understood.
b) Show his sincere sympathy for the patient.
c) Relaxes the patient
d) Reflect his good upbringing.
e) Indicate good communication skills.

Q.75 Empathic skills are essential for better therapeutic relationship and include reflection, validation, support, respect and :

a) Exclusivity.
b) Unconditional positive regard.
c) Informational care.
d) Partnership.
e) Friendship.

Q.76 Counselling is a technique which aims at :

a) Making people less emotional.
b) Achieving a greater depth of understanding and clarification of the problem
c) Comparing the patient's experiences with one's own.
d) Giving sincere advice and solutions to the patients problems
e) Breaking bad news in a professional manner.

Q.77 A doctor aiming to adopt the role of a counsellor must exhibit and develop attributes such as :

a) Wide ranging knowledge base,
b) Charismatic personality
c) Mastery of the local dialect.
d) Unconditional positive regard.
e) Honest and simple life style.

Q.78 A 56 years old male patient has just been diagnosed with Diabetes Mellitus. His physician is concerned about his treatment compliance with the prescribed regimen of medication and dietary changes. The patient is most likely to follow the instructions given by the physician if the conversation with the physician makes the patient :

a) Calm and collected.
b) Calm and questioning.
c) Concerned and attentive
d) Worried and distracted.
e) Fearful and self absorbed.

Q.79 Consent is the agreement of the patient to an examination, procedure, treatment or intervention. Which of the following pillars of medical ethics does it represent?

a) Justice
b) Beneficence
c) Autonomy
d) Non-malaficence
e) Confidentiality.

Q.80 A patient constantly defying prohibitions by the doctors in spite of repeated warnings of serious consequences is displaying the phenomena of:

a) Transference
b) Resistance
c) Counter-transference
d) Non-compliance.
e) Emotional instability.

Q.81 An embolus in the arterial system does not originate from all but:

a) Myxoma in the left atrium.
b) An atheromatous plaque.
c) Venous thrombosis.
d) Prosthetic pulmonary valve.
e) Air entering venous cannula.

Q.82 Infarction can occur as a complication of

a) Atherosclerosis.
b) Monckher's sclerosis.
c) Benign hypertension.
d) Idiopathic thrombocytopenic purpura.
e) Von-Willibrand disease.

Q.83 Sudden death in embolism may be due to

a) Pulmonary embolism.
b) Cerebral embolism.
c) Coronary embolism.
d) Embolism of the femoral artery.
e) Thrombus in atrial appendage.

Q.84 Following is not a major cause of shock:

a) Hypovolemia.
b) Myocardial infarction.
c) Nephrogenic uraemia.
d) Sepsis.
e) Anaphylaxis.

(Continued)

Q.85 Anasarca is a clinical feature of the following:

a) Nephrotic syndrome.
b) Proteinuria> 12 G/24hrs since 15 days.
c) Congestive heart failure.
d) Malnutrition.
e) Wasp-sting.

Q.86 Pitting oedema does not occur in:

a) Chronic renal failure.
b) Congestive heart failure.
c) Myxoedema.
d) Cirrhosis of liver.
e) Acute anaphylaxis.

Q.87 A biopsy of cervix microscopically shows disordered maturation of the squamous epithelium, with hyperchromatic and pleomorphic nuclei extending nearly the full thickness of the epithelial surface. No inflammatory cells are present. Which of the following descriptive terms is best applied to the biopsy findings?

a) Dysplasia.
b) Metaplasia.
c) Anaplasia.
d) Hyperplasia.
e) Apoptosis.

Q.88 A 43-year-old man has biopsy form lower esophagus that demonstrates the presence of columnar epithelium with goblet cells. Which of the following mucosal alteration is most likely represented by these findings?

a) Dysplasia.
b) Hyperplasia.
c) Carcinoma.
d) Ischaemia.
e) Metaplasia.

Q.89 DNA virus is involved in which of the following tumour:

a) Epithelial carcinoma.
b) Nasopharyngeal carcinoma.
c) Hepatocllular carcinoma.
d) B-cell Lymphoma.
e) Multiple myeloma.

Q.90 Bacterium known to cause cancer is:

a) E.coli.
b) Bacillus Anthrax.
c) H. pylori.
d) Actinomyces israelii.
e) Clostiridium botulinum.

Q.91 Which of the fallowing is not a malignant lesion?

a) Chondrosarcoma.
b) Squamous cell carcinoma.
c) Choriostoma.
d) Adenocarcinoma.
e) Neuroblastoma.

Q.92 Which of the fallowing feature is characteristic of benign tumour?

a) Tumor cell infiltrate in the surrounding tissue.
b) Tumor metastasize in distal organ.
c) Tumor does not have metastasis.
d) The tumor cell are pleomorphic and have hyper chromatic nuclei.
e) Abnormal mitoses are present.

Q.93 Which of the following feature favours benign nature of lesion?

a) Pleomorphic hyper chromatic nuclei.
b) Disturbed nuclear to cytoplasmic ratio.
c) Infiltration in the surrounding tissue.
d) Non invasive growth pattern.
e) Presence of abnormal mitoses.

Q.94 Which of the following is not pre neoplastic lesion?

a) Villous adenoma of colon.
b) Leukoplakia.
c) Atrophic gastritis.
d) Adrenal hypoplasia.
e) Atypical endometrial hyperplasia.

Q.95 The incidence of mesothelioma is more in:

a) Asbestos worker.
b) Deep sea divers.
c) Astronauts.
d) Persons dealing with birds.
e) Fishermen.

(Continued)

Q.96 A radiotherapist attempts at treating a particular disease by two different modes. He/she adopts a process of randomization in the selection of the two groups. Which of the following descriptions would ideally describe the steps:

a) Ensuring an equal number of cases in the two treatment modes.
b) Ensuring the matching steps of making the two groups similar for age, sex and socio-economic characters.
c) Allowing every member of the diseased group to have an equal chance of selection in the two groups.
d) Allowing the choice of the patients to be treated by any mode by informed consent.
e) Keeping it double blind by not letting the patients or the doctor to know the mode of treatment.

Q.97 An oncologist studies a group of 100 patients of cancer lung and prepares a report of classifying them by age, sex, habits, profession, income status etc. What type of study would you label this study as:

a) Cross-sectional analytic study.
b) A case report.
c) A cohort study.
d) An experimental study.
e) A descriptive study.

Q.98 Before undertaking a topic for research the physician undertakes literature search. Which of the following source would be the best:

a) Funding agency.
b) From peers and colleagues.
c) From standard text books.
d) From scientific meetings.
e) From PubMed of indexed journals.

Q.99 A policy maker at the federal level wishes a study to be undertaken by a researcher. What would be best requirement of the policy maker to undertake a study:

a) The policy maker is driven by the interest of the researcher.
b) The researcher has some special equipment and laboratory to investigate rare problems.
c) The policy maker wishes to find the relative superiority of one drug over another.
d) The policy maker wishes the researcher to undertake priority health problems.
e) The policy maker is influenced by a funding international agency for a specific problem.

Q.100 Every researcher is currently required to get the topic of research to be ethical. How does ethics in research imply:

a) Investigator should feel confident about his capability to undertake the research.
b) An informed consent is the best requirement.
c) Necessary facilities and resources should be available.
d) Institutional review committee should clear the research proposal.
e) Researcher should ensure safety, confidentiality and rights of the subjects of study.