ARMED FORCES INSTITUTE OF RADIOLOGY & IMAGING (AFIRI)

TABLE OF SPECIFICATION FOR NUMS ADMISSION TEST (2025)

For FSc MIT Students

Subject	No of Questions
Anatomy	10
Physiology	10
Radiology techniques	20
Physics	10
Total	50

Course Title: **ANATOMY**

S No	Topic / Area
1.	Anatomical Terminologies
2.	Integumentary System Anatomy
3.	Musculoskeletal System Anatomy
4.	Nervous System Anatomy
5.	Cardiovascular System Anatomy
6.	Gastrointestinal System Anatomy
7.	Genitourinary System Anatomy
8.	Respiratory System Anatomy

Course Title: **PHYSIOLOGY**

S No	Topic / Area
1.	Homeostasis
2.	Cellular Level Of Organization
3.	Tissue Level Of Organization
4.	Integumentary System Physiology
5.	Musculoskeletal System Physiology
6.	Nervous System Physiology
7.	Endocrine System Physiology
8.	Cardiovascular System Physiology
9.	Gastrointestinal System Physiology
10.	Genito Urinary System Physiology
11.	Respiratory System Physiology

Course Title: **RADIOLOGY TECHNIQUE**

S No	TOPIC / AREA
1.	Conventional Imaging Modalities
2.	X-Rays

S No		TOPIC / AREA
3.		Modern Imaging Techniques
4.		Computer Tomography
5.		Ultrasound
6.		Magnetic Resonance Imaging (MRI)
7.		Positron Emission Tomography

Course Title*:* **PHYSICS**

S No		TOPIC / AREA
1.	**Measurement**	Physical quantities, numerical magnitude and a proper unit.
		International system of Units, SI base units of physical quantities, and their derived units.
		Prefixes and symbols to indicate decimal, submultiples or multiples of both base and derived units: • Errors and uncertainties • Systematic error and random error. • Fractional uncertainty and percentage uncertainty.
		Assessment of total uncertainty in the final results (Understand of total assessment about addition and subtraction, multiplication and division & power factor).
2.	**Motion and Force**	Displacement, Distance, Speed, Velocity and Acceleration.
		Velocity-Time Graph
		Equations of motion.
		Newton's laws of Motion
		Momentum and law of conservation of momentum.
		Force and rate of change of momentum.
		Impulse and $I F \times t = mv_f - mv_i$
		Elastic and in-elastic collisions
		Projectile Motion and its applications.
		Moment of force or torque and use of torque.
		Equilibrium.
3.		Work in terms of the product of a force and displacement in the direction of the force.
	Work Energy & Power	Kinetic energy $K.E = 1/2\ mv^2$
		Potential energy $P.E = mgh$.
		Inter-conversion of kinetic energy and potential energy in gravitational field.
		Power in terms of work done per unit time and use power Work as product of force and velocity $P = \frac{W}{t}$ and $P = Fv$.

4.	**Circular Motion**	Angular motion, angular displacement & angular velocity.
		Centripetal Force and centripetal acceleration. $F = mr^2\omega$, $F = mv^2/r$ and $ac = r\omega^2$ and $ac = v^2/r$
		Geostationary orbits.
		Radian.
5.	**Oscillations**	Simple harmonic motion
		Amplitude, Frequency, Angular Frequency, Phase Difference. Express the time period in terms of both frequency and angular frequency.
		Equations $x = x_0 \sin wt$, $v = v_0 \cos wt$, $v = \pm\sqrt{x^2_0 - x^2}$, $a = \omega^2 x$ and its use.
		Motion of simple pendulum and relation.
		Kinetic energy and potential energy during Simple harmonic motion.
		Free, Forced and Damped Oscillations.
		Resonance.
6.	**Waves**	Progressive waves
		Transverse and longitudinal waves.
		Principle of superposition.
		Stationary waves and wavelength of sound waves in air columns and stretched strings.
		Doppler's Effect
		Electromagnetic Spectrum.
7.	**Light**	Interference of light waves, constructive and destructive interference.
		Young's Double Slit experiment, fringe spacing, dark and bright fringes.
		Diffraction (basic principle).
		Diffraction grating.
8.	**Heat and Thermodynamics**	Basic postulates of kinetic theory of gases
		Pressure exerted by a gas and derive the relation $PV = Nm/3 <v^2>$
		Equation of state for an ideal gas as $PV = nRT$
		$PV = Nm/3 <v^2>$ and $PV = NkT$ and prove that K.E ¤ T for a single molecule.
		Internal Energy.
		Specific Heat capacity.
		Coulomb's Law.
		Electric field strength.
		$E = \dfrac{\Delta v}{\Delta d}$

9.	**Electro statistics**	Electric field lines.
		$\dfrac{Q}{4\pi\varepsilon_o r^2}$
		Gravitational force and electric force.
		Electric potential
		Capacitance of a capacitor
		Energy stored in capacitor
10.	**Current Electricity**	Current.
		Ohm's Law.
		Series and parallel Combination of resistors.
		Resistance and resistivity.
		Potential difference and e.m.f.
		Power dissipation in resistors.
		Kirchhoff's First Law as conservation of charge.
		Kirchhoff's Second Law as conservation of energy.
		Potentiometer.
11.	**Electromagnetism**	Magnetic field.
		Force on current carrying conductor in uniform magnetic field.
		Force on a moving charge in magnetic field.
		Motion of charge particle in uniform electric and magnetic field.
		e/m for an electron.
12.	**Electromagnetic Induction**	Magnetic flux.
		Faraday's Law and Lenz's Law.
		Induced e.m.f and factors.
		Electromagnetic
		Induction
		Alternating current and use $V = V_0 \sin\omega t$
		Transformer and uses of $N_S/N_P = V_S / V_P = I_P / I_S$ and practical transformer.
		Period, frequency, peak value and root mean square value of an alternating current or voltage.
		Stress, strain and Young's Modulus.
		Tensile stress and strain

13.	**Deformation of Solids**	Hook's Law
		Elastic and plastic deformation of a material
		Strain energy
		Band Theory, valence band, conduction band and forbidden band.
14.	**Electronics**	Half and Full wave rectification.
		Single diode for half wave rectification of an alternating current.
		Four diodes for full wave rectification of an alternating current.
		Operational amplifier and its characteristics
15.	**Modern Physics**	Energy of photon $E = hf$.
		Photoelectric Effect, Threshold Frequency and Work Function Energy.
		Maximum photoelectric energy is independent of intensity whereas photoelectric current is proportional to intensity.
		Einstein's Photoelectric equation $hf = \emptyset + \frac{1}{2} mv^2$ max.
		de Broglie wavelength and use $\lambda = h/p$
		Discrete energy levels of hydrogen atom and spectral lines.
		Relation $hf = (E_2 - E_1)$
		Production of X-rays and features of X-rays tube.
16.	**Nuclear Physics**	Nucleus, nucleon number and charge number
		Radioactivity and emission of radiation
		Activity, Decay constant and relation Activity $= N \lambda$
		Half-life of radioactive substance and relation $\lambda = .693/t_{1/2}$
		Nuclear transmutation and conservation of mass, energy, momentum and charge during nuclear changes
		Mass-defect, binding energy and relation $E = mc^2$
		Nuclear fission and fusion.
		Hadrons, Leptons and Quarks.