AMATEUR RADIO EXAMINATION SYLLABUS

(NOVICE CLASS)

(WITH EFFECT FROM 1990)

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AMATEUR RADIO OPERATOR'S NOVICE CLASS

CERTIFICATE OF PROFICIENCY

This examination consists of two parts.

PART 1 Two seperate Written Papers

The questions will be based on the syllabuses attached.

(i) Basic Electricity, Radio & Electronics Theory (Two hours)

This question paper will contain 50 multiple choice questions.

(ii) Licencing conditions, operating practices & procedures (One hours)

This question paper will contain 25 multiple choice questions.

(i) BASIC ELECTRICITY, RADIO & ELECTRONICS THEORY

(WRITTEN PAPER – SYLLABUS)

1. Electrical Theory

1.1 Basic electrical terms, their meaning and use: e. m. f. current, conductor, resistance, insulator, power, series circuit, parallel circuit.

1.2 Current, power and resistance : Ohm's law, Total current and effective resistance in series and parallel circuits, power in a. d. c. circuit.

1.3 Sinewave, Definition of terms: amplitude, period and frequency: Instantaneous, peak, peak-to-peak, r. m. s. values.

1.4 Inductance and capacitance: units; effects in a. c. circuits: Meaning of inductive and capacitive reactance. Factors affecting capacitance and inductance value.

1.5 Power, reactance, impedance and resonance in a. c. circuits : simple explanation of terms; phase angle, phase difference, phase lead and lag, reactance, impedance, series resonance, parallel resonance, resonant frequency and Q (magnification)

1.6 Decibel : application in power measurement.

1.7
1. Transformers : function and operation
2. Tuned circuits : series and parallel a. c. circuits, resonant frequency calculations: voltage amplification and current amplification. Maintenance of oscillations in tuned circuits. Dynamic resistance.

1.8 Types of components used and their applications in electronic equipment; tolerances and preferred values.

1.9 Circuit symbols employed in circuit drawings.

2. Solid State Devices

2.1 Characteristics and principles of operation of npn and pnp transistors; principles of diode rectification; control of output current and voltage when transistors are used as
audio-frequency and radio-frequency amplifiers.

2.2 Use of solid state devices, including integrated circuits, In radio equipment as
- a) oscillators (crystal & variable frequency types)
- b) amplifiers (audio-frequency and radio-frequency types)
- c) frequency changers
- d) frequency multipliers
- e) demodulators

2.3 Typical power supply circuits; power rectification; smoothing and voltage stabilization systems.

3. Vacuum Tubes.

3.1 Vacuum tube construction & characteristics

- a) diode
- b) triode
- c) tetrode
- d) pentode
- e) cathode ray tube (CRT)

3.2 Vacuum tube amplifers, application and function of common types, importance of bias.

3 Receivers

4.1 Principles of reception of continuous wave, double - sideband and frequency-modulated signals in terms of radio - frequency amplification ; frequency changing (where appropriate); demodulation or detection ; automatic gain control; audio amplification. The superheterodyne principle of reception.

4.2 Advantages and disadvantages of high and low intermediate frequencies: adjacent channel and image frequency interference and their avoidance.

4.3 Typical receivers; use of a beat- frequency oscillator, Characteristics of a single - sideband signal and the purpose of a carrier insertion oscillator.

5 transmitters

5.1 Oscillators used in transmitters; stability of variable frequency and crystal controlled oscillators; their construction and factors affecting stability.

5.2 Transmitter stages: operation of frequency changers, frequency multipliers, high and low power amplifiers (including linear types.) Transmitter tuning and adjustment.

5.3 Methods of keying transmitters for telegraphy advantages and disadvantages.

5.4 Methods of modulation and types of emission in current use including single - sideband and frequency / phase modulation emission in the A3E, J3E, F3E and G3E modes; relative advantages, Adjustment of level of modulation.

6. Propagation

6.1 Explanation of basic terms; ionosphere, troposphere, atmosphere, field strength, polarization, maximum usable frequency, critical frequency, skip distance.

6.2 Generation of electromagnetic waves; relationship between electric and magnetic components.

6.3 Structure of the ionosphere. Refracting and reflecting properties of the ionosphere and troposphere. Effect of sunspot cycle, winter and summer seasons and day and night on the ionization of the upper atmosphere; effect of varying degrees of ionization on the propagation of electromagnetic waves.

6.4 Ground wave, ionospheric and tropospheric propagation.

6.5 Fade out and types of fading; selective, interference, polarization, absorption and skip.

6.6 Velocity of radio waves in free space; relationship between velocity of propagation, frequency and wavelength; calculation of frequency and wavelength.

7. Transmission Lines & Antenna

7.1 Co-axial and balanced transmission lines.

7.2 Standing waves.

7.3 Voltage standing wave ratio.

7.4 Common types of transmitting and receiving antenna.

7.5 Directional systems.

7.6 Aerial coupling to lines and transmitters.

7.7 Impedance matching methods.

8. Test Equipment & Measurements

8.1 Types of instruments used in radio work for the measurement of a. c., d. c. and r. f. voltages and currents; errors in measurement.

8.2 Measurement of
- a) d. c. power input to power amplifiers
- b) r. f. power output of power amplifiers.
- c) Current at radio frequencies.

8.3 Purposes, operation and use of absorption wave meters, crystal calibrations heterodyne wave meters and frequency counters; relative accuracies.

8.4 Dummy loads, their construction and use in tuning transmitters.

8.5 Use of standing-wave ratio meters.

8.6 Setting up and use of an oscilloscope to examine and measure waveforms and monitor the depth of modulation.

8.7 Use of dip oscillator.

9. Interference

9.1 Frequency stability; consequences of poor frequency stability, risks of interference out-of -band radiation.

9.2 Spurious emissions, causes and methods of prevention; harmonics of the radiated frequency, direct radiation from frequency determining and frequency changing stages (including synthesizers) of a transmitter, parasitic oscillations, key clicks, excessive side band due to over modulation. Excessive deviation of f. m. transmitters.

9.3 Restriction of audio bandwidth, typical methods used and their limitations.

9.4 Mains borne interference, causes and methods of suppression.

9.5 The requirements for frequency checking equipment.

10. Station Safety Practices

10.1 Safety with high voltages.

10.2 Mains wiring.

10.3 Lighting protection.

10.4 Equipment grounding.

10.5 Handling of storage batteries.

(II) LICENCING CONDITIONS, OPERATING PRACTICES AND PROCEDURES

(WRITTEN PAPER - SYLLABUS)

1. Definitions of Amateur Radio Service and General terms in usage with Amateur Radio.

2. ITU Radio Regulations.

   Local Radio Regulations and Rules.
   Terms and conditions of the licence.

3. Technical Provisions :

   Radio Frequency Bands.
   Transmitter power.
   Types of Emission.
   Avoidance in interference.
   Installation & operation of equipment.
   Antenna Gain.
   Experiments and contests.
   Safety precautions.
   Use of Satellites & Repeaters; accessing a repeater.

4. General Provisions :

   Secrecy of communications.
   Emergency Amateur Networks.
   Licensee to receive distress signals.
   Log keeping
   Land Mobile Operations.
   Prohibited Traffic.
   Responsibility of the licensee for operation
   Call Signs.
   Liability for breaches of Law.