

Examination for the issue of Amateur Radio Operator's License by the Telecommunications
Regulatory Commission of Sri Lanka (Advance Class) – 2017 (2018)

(01) Advanced Electrical Technology and Radio Communication

Three hours

* Answer **ten** questions only. All questions carry equal marks.

* A minimum of 50% marks is required for pass.

1. Describe the following semi-conductor devices giving an example of one application for each.
 - (i) Field effect transistor (FET)
 - (ii) Zenor Diode
 - (iii) Silicon Controlled Rectifier (SCR)

2. Write short notes on the following
 - (i) Series Resonance circuit
 - (ii) Low pass and High pass filters
 - (iii) Balanced and unbalanced feeder line

3. Describe briefly the principal of operation of a super heterodyne receiver by using a suitable block diagram.

4. List down the advantages and disadvantages of Single Side Band (SSB) and Double Side Band (DSB) amplitude modulations.

5.
 - (i) Draw the circuit diagram of a half wave diode rectifier.
 - (ii) Draw the output wave form of the above circuit to an input sinusoidal signal. What happens to the output wave form when a smoothing capacitor is introduced At the output of the circuit.

6.
 - (i) A half wave dipole antenna has resonance frequency of 60 MHz. What is the length of the antenna?
 - (ii) Draw the radiation pattern of a $\lambda/2$ dipole antenna on the horizontal and vertical planes.

7. A FM radio has an input voltage and frequency of 230V and 50 Hz respectively. It has a rectifier circuit to convert AC to DC.
 - (i) Propose a half wave rectifier circuit to convert the AC voltage to a DC voltage.
 - (ii) Sketch the output waveform.

8. (i) What is the relationship between inductive reactance and capacitive reactance, when resonance occurs, in a series circuit?
- (ii) A series circuit has a resistance of $50\ \Omega$ and inductance of 0.5H . A variable capacitor in series is connected across a 230V , 50Hz supply. Calculate the capacitance at resonance.
9. (i) Briefly explain the term standing wave ratio (SWR) of a transmission line.
(ii) A half wave antenna is resonance at $30\ \text{MHz}$. What is its length?
(iii) What is the characteristic impedance of a half-wave dipole antenna?
10. Write short notes on the following.
(i) ground wave
(ii) ionospheric wave
(iii) tropospheric wave
11. (i) List at least five of the basic test instrument that are used in an Amateur radio station
(ii) Explain the usage of two of above mentioned instruments.
12. List the steps that have to be taken to minimize the damages due to lightning of an Amateur radio station.