

## DEPARTMENT OF EXAMINATION SRI LANKA

EXAMINATION FOR THE AMATEUR RADIO OPERATORS' CERTIFICATE OF PROFICIENCY  
ISSUED BY THE DIRECTOR OF TELECOMMUNICATIONS OF SRI LANKA-APRIL 1993  
(GENERAL CLASS)

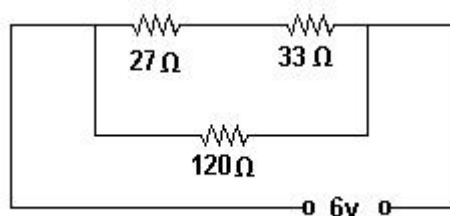
Index No. ....

**FUNDAMENTALS OF ELECTRICITY & RADIO COMMUNICATIONS***Two hours*

Answer **all** questions on this paper itself. A minimum of 50 marks is required for a pass.  
Choose the correct answer and **underline it**.

- Resistors of  $12\ \Omega$ ,  $15\ \Omega$  and  $20\ \Omega$  are connected in parallel. What is the effective resistance?  
(a)  $47\ \Omega$       (b)  $30\ \Omega$       (c)  $5\ \Omega$       (d)  $10\ \Omega$
- Capacitors of  $8\ \mu\text{F}$ ,  $4\ \mu\text{F}$  and  $2\ \mu\text{F}$  are connected in Parallel. What is the effective Capacitance?  
(a)  $1.14\ \mu\text{F}$       (b)  $14\ \mu\text{F}$       (c)  $14\ \text{F}$       (d)  $1.5\ \mu\text{F}$
- Two inductors of  $10\ \mu\text{H}$  &  $20\ \mu\text{H}$  are connected in series; two others of  $30\ \mu\text{H}$  &  $40\ \mu\text{H}$  are also connected in series. What is the equivalent inductance if these series combinations are connected in parallel?  
(a)  $21\ \mu\text{H}$       (b)  $23.8\ \mu\text{H}$       (c)  $20\ \mu\text{H}$       (d)  $100\ \mu\text{H}$
- At what frequency do a capacitor of  $100\ \text{pF}$  & an inductance of  $100\ \mu\text{H}$  resonance?  
(a)  $160\ \text{kHz}$       (b)  $1.6\ \text{MHz}$       (c)  $3.2\ \text{MHz}$       (d)  $3.2\ \text{kHz}$

5.

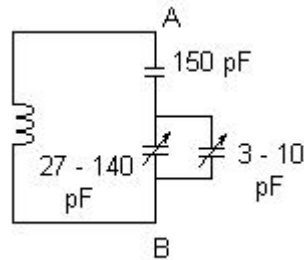


- The current flow through the  $27\ \Omega$  resistor has a value of  
(a)  $27\ \text{mA}$       (b)  $33\ \text{mA}$       (c)  $60\ \text{mA}$       (d)  $100\ \text{mA}$
6. The voltage across the  $33\ \Omega$  resistor in the above question is  
(a)  $0.6\ \text{v}$       (b)  $1.2\ \text{v}$       (c)  $3.3\ \text{v}$       (d)  $4.5\ \text{v}$
7. A loudspeaker speech coil has a resistance of  $4\ \Omega$ . If the voltage across it is  $4\ \text{v}$ , then the power in the speech coil is  
(a)  $4\ \text{w}$       (b)  $3\ \text{w}$       (c)  $6\ \text{w}$       (d)  $9\ \text{w}$

8. A coil has a reactance of  $1000\Omega$  and a resistance of  $10\Omega$ . It's approximate impedance is

- (a)  $990\Omega$       (b)  $1000\Omega$       (c)  $1100\Omega$       (d)  $10\text{ k}\Omega$

9.



When the variable capacitor & the trimmer capacitor of a local oscillator tuned circuit are adjusted to their maximum values, the effective capacitance between points A & B will be

- (a)  $50\text{ pF}$       (b)  $75\text{ pF}$       (c)  $200\text{ pF}$       (d)  $300\text{ pF}$

10. The peak to peak value of a Sine-wave having an R.M.S voltage of  $14.1\text{V}$  is approximately

- (a)  $20\text{ V}$       (b)  $28.2\text{V}$       (c)  $40\text{ V}$       (d)  $56.4\text{ V}$

11. Which of the instruments below can measure the exact frequency of a component in a complex waveform?

- (a) a heterodyne wavemeter      (b) a digital frequency counter  
(c) an absorption wavemeter      (d) an oscilloscope waveform

12. Double sideband, suppressed carrier transmissions are

- (a) prohibited      (b) permitted  
(c) allowed with written permission      (d) allowed only on VHF frequencies

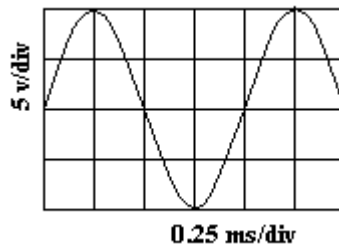
13. Interference is experienced in the  $144\text{ MHz}$  band from some  $432\text{ MHz}$  crystal controlled equipment . The basic oscillator is around  $12\text{ MHz}$ . The most likely multiplication order is

- (a)  $\times 2 \times 3 \times 3 \times 2$       (b)  $\times 2 \times 2 \times 3 \times 3$   
(c)  $\times 3 \times 3 \times 2 \times 2$       (d)  $\times 3 \times 2 \times 3 \times 2$

14. Which type of mixer keeps unwanted outputs to a minimum ?

- (a) A balanced mixer      (b) A product detector  
(c) Single transistor mixers      (d) Single diode mixers

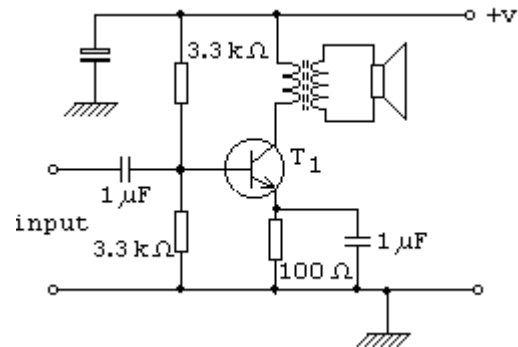
16. Having established contact on a calling frequency, it is a good practice to  
 (a) stay on the same frequency  
 (b) move to another frequency  
 (c) invite others to join in on the same frequency  
 (d) be objectionable to all others calling
17. The purpose of a terrestrial repeater is to  
 (a) increase satellite coverage.  
 (b) increase the range of mobile stations.  
 (c) increase the range of fixed stations.  
 (d) minimise contacts of pedestrian stations.
18. The band plans should be observed because  
 (a) they are mandatory. (b) they are governed by International Regulations.  
 (c) they try to aid operations. (d) they are only for novices.
19. The diagram represents a trace on an oscilloscope. What is the frequency of the displayed waveform?  
 (a) 1 kHz (b) 5 kHz (c) 10 kHz (d) 100 kHz



20. As the frequency rises, the reactance of an inductor,  
 (a) stays constant (b) decreases (c) increases (d) none of these
21. A power gain of 4 is equivalent to  
 (a) 3 dB (b) 6 dB (c) 10 dB (d) 16 dB
22. A reverse biased diode exhibits  
 (a) no resistance (b) low resistance  
 (c) high resistance (d) high inductance

23. The circuit shown is that of

- (a) an audio amplifier
- (b) an RF amplifier
- (c) a mixer
- (d) a BFO



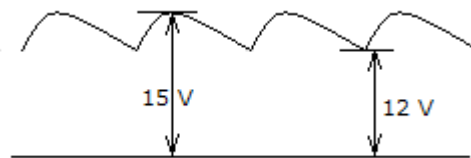
24. The circuit in question No.23 would operate in class

- (a) A
- (b) AB
- (c) B
- (d) C

25. Integrated circuits that perform logic functions come under the general classification of

- (a) linear circuits
- (b) Amplifiers
- (c) mixers
- (d) digital circuits

26. The trace shown is that of the output of a D.C. power supply. The ripple is



- (a) 1 V
- (b) 3 V
- (c) 12 V
- (d) 15 V

27. In a receiver, narrow bandwidth normally gives

- (a) poor selectivity
- (b) no selectivity
- (c) high selectivity
- (d) negative selectivity

28. The frequency difference between the wanted RF signal and the so called second channel is

- (a) twice the third IF
- (b) twice the wanted RF
- (c) twice the first IF
- (d) the wanted RF plus the first IF

29. The squelch in a receiver is operated by

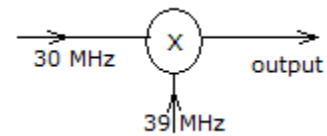
- (a) the VFO
- (b) the power supply
- (c) the heterodyne oscillator
- (d) either the IF or AF signal

30. The effect of the AGC on receipt of a very strong incoming signal is to

- (a) reduced the VFO output
- (b) reduce the gain of IF and AF amplifier
- (c) reduce the power supply voltage
- (d) reduce the filter response

31. The principal outputs from the given circuit are

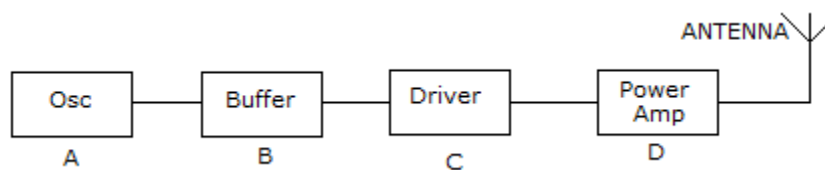
- (a) 9 & 39 MHz      (b) 9 & 69 MHz  
 (c) 30 & 39 MHz    (d) 39 & 69 MHz



32. In order to demodulate CW transmission in an “AM only” receiver, which of the following is required?

- (a) A BFO                      (b) An FM detector  
 (c) A cristal multiplier      (d) A Morse key

33.



The above is a CW transmitter. Keying should be applied at

- (a) A                      (b) B                      (c) C                      (d) D

34. The output amplifier of an SSB transmitter must

- (a) act as a switch                      (b) be in a linear mode  
 (c) be in a non-linear mode          (d) act as a multiplier

35. If the power supply to the output stage is modulated this produces

- (a) AM                      (b) FM                      (c) NBFM                      (d) PM

36. Electro magnetic radiation must have

- (a) E field only                      (b) H field only  
 (c) E & H fields                      (d) air to travel through

37. The polarization of an electromagnetic wave is determined by

- (a) the direction of H- field      (b) the direction of the propagation  
 (c) none of these                      (d) the orientation of the transmitting antenna

38. The signal returned from the layers above the earth are referred to as

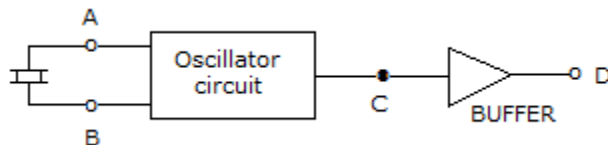
- (a) the ground wave                      (b) ionospheric wave  
 (c) the tropospheric wave                      (d) the direct wave.

39. A dummy load for use at VHF should be made

- (a) wire-wound resistors                      (b) carbon resistors  
 (c) metal oxide resistors                      (d) electric fire heating elements

40. The coaxial cable from an SWR meter to an antenna develops a fault so that no power reaches the antenna. The SWR meter will read  
 (a) zero (b) 1:1 (c) high (d) very low
41. The 10 m-band lies between  
 (a) 28.0 and 28.7 MHz (b) 28.7 and 29.0 MHz.  
 (c) 28.0 and 29.0 MHz (d) 28.0 and 29.7 MHz.

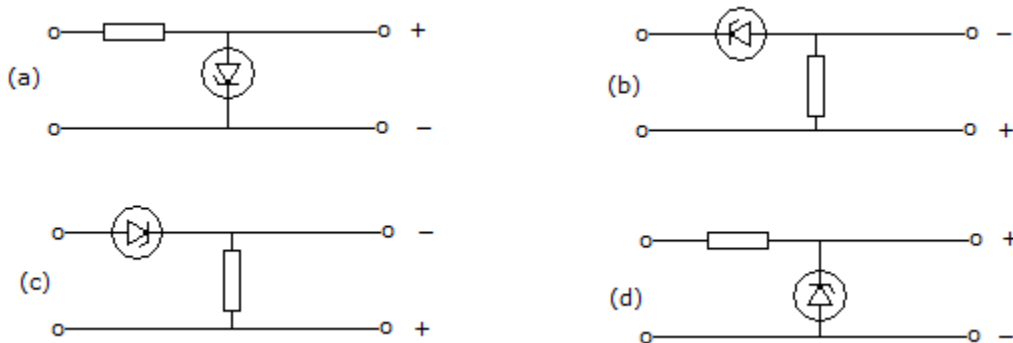
42.



When measuring frequency in the above equipment, the probe should preferably be placed at

- (a) A (b) B (c) C (d) D
43. A multiband antenna is  
 (a) less likely to radiate harmonics (b) more likely to radiate harmonics  
 (c) never going to radiate harmonics (d) more efficient than a dipole
44. When trying to decouple RF at the loudspeaker lead, the type of capacitor to use is  
 (a) ceramic (b) electrolytic (c) paper (d) polycarbonate
45. To prevent annoying other users on a band, a transmitter should always be tuned  
 Initially  
 (a) on a harmonic (b) into an antenna  
 (c) into a dummy load (d) on a dipole
46. When working through a satellite, it is necessary to use  
 (a) as much power as possible (b) "Esperanto" language  
 (c) sufficient power to maintain reliable communication (d) FM only

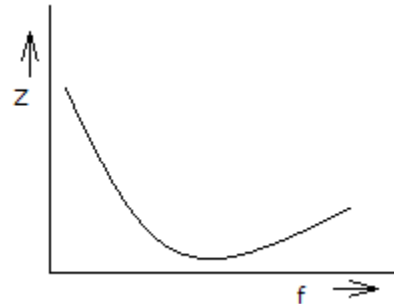
47.



Which of the above is typical of a Zener Diode voltage stabilizer of the correct polarity?

48. What is the length of a piece of coaxial cable cut for a full wavelength at 100 MHz, if the velocity factor is 0.66 ?  
 (a) 0.18 m    (b) 1.8 m    (c) 3m    (d) 18 m
49. The majority charge carries in an N-type region are  
 (a) holes    (b) electrons  
 (c) both holes and electrons    (d) neither holes nor electrons
50. The impedance- frequency curve shown represents

- (a) a capacitance  
 (b) a parallel tuned circuit  
 (c) an inductance  
 (d) a series tuned circuit



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Answers:-

- |       |       |        |       |       |
|-------|-------|--------|-------|-------|
| 1. c  | 2. c  | 3. a   | 4. b  | 5. d  |
| 6. c  | 7. a  | 8. b   | 9. b  | 10. a |
| 11. d | 12. b | 13. b  | 14.   | 15.?? |
| 16. b | 17. b | 18. b. | 19. a | 20. c |
| 21. b | 22. c | 23. a  | 24. a | 25. d |
| 26. b | 27. c | 28.    | 29. d | 30. b |
| 31. b | 32. a | 33. d  | 34. b | 35. a |
| 36. c | 37. d | 38. b  | 39. b | 40. c |
| 41. d | 42. d | 43. b  | 44. a | 45. c |
| 46. c | 47. d | 48. b  | 49. b | 50. d |

Q-15 there is no question no.15

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ISSUED BY THE DIRECTOR OF TELECOMMUNICATIONS OF SRI LANKA – 1993 APRIL  
(GENERAL CLASS)**LICENSING CONDITIONS, OPERATING PRACTICES AND PROCEDURES***One hours*

Index No. ....

Answer **all** questions on this paper itself.  
Pick out the correct answer and **underline it**.  
A minimum of 50 marks is required for a pass.

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1. Proper definition of “AMATEUR SERVICE” is
  - (a) a service dedicated for the Radio Amateurs carried out by professional broadcast stations.
  - (b) a service of self-training, intercommunications had technical investigations carried on by amateurs solely with a personal aim and without monetary gain or interest.
  - (c) a service dedicated for the advancement of amateurs.
  - (d) a broadcasting service carried out by untrained personal.
  
2. A “FIXED STATION” means
  - (a) a station licenced to operate within a certain area.
  - (b) a station fixed or installed in a radio direction finding station.
  - (c) an amateur station licenced to operate from a fixed location specified in the licence.
  - (d) a station so designed to transmit in a fixed direction.
  
3. “HARMFUL INTERFERENCE” means
  - (a) emissions on a frequency or frequencies which are outside the necessary bandwidth which may be reduced without affecting the corresponding transmission of information.
  - (b) any emission, radiation or induction which endangers the functioning of radio navigation service or other safety service.
  - (c) noise generated by electrical disturbances.
  - (d) key clicks and chirping.
  
4. “AMATEUR SATELLITE STATION” means
  - (a) a linking station in a chain of transmitting stations.
  - (b) a temporarily installed amateur station linked to the permanent stations.
  - (c) an amateur station moved from place to place.
  - (d) a radio communication service using space stations on earth satellites for the same purpose as those of the amateur service.



5. Correct definition of “DUPLEX OPERATION” is
- a transmission method using two different frequencies
  - double side band transmission
  - an operating method in which transmission is possible simultaneously in both directions.
  - transmission using encoded signals.
6. An amateur radio station shall be used to
- transmit communications on behalf of third parties.
  - carry out radio traffic in plain language.
  - communicate messages for payment or other compensation.
  - send distress signals, calls and messages.
7. Following documents shall be made available for the inspection of an amateur radio station.
- Amateur radio station licence only
  - Licence holder’s certificate of competence and station log book.
  - Amateur station licence, licence holder’s certificate of competence, circuit diagram of the transmitters and station log book.
  - Licence holder’s certificate of competence, log book and circuit diagram of the transmitters.
8. During the absence of the licence holder an amateur radio station may be operated by an other licence holder, provided that he
- Obtains special permission from the Director General of Telecommunications.
  - Identifies the transmission by transmitting the call sign of the station been operated.
  - Identifies the transmission by transmitting his own call sign.
  - Identifies the transmission by his own call sign followed by the call sign of the station been operated.
9. An amateur holding a valid amateur radio operator’s licence may communicate with
- any amateur station in any country.
  - only with amateurs designated in the licence.
  - licenced amateur stations only.
  - any broadcasting station or radio station.
10. Your call sign is 4S7XX. You wish to contact VK7AB on radio telegraphy. Example of your call would be
- .-. VK7AB VK7AB VK7AB -.. 4S7XX 4S7XX -.-
  - .-. VK7AB VK7AB VK7AB -.. 4S7XX 4S7XX 4S7XX -.-
  - .-. VK7AB -.. - 4S7XX
  - .-. VK7AB VK7AB -.. 4S7XX 4S7XX -.-

11. Your call sign is VK7AB. You reply to a call by 4S7XX.  
Example of call received by 4S7XX is in radio telegraphy.
- .- 4S7XX 4S7XX 4S7XX -.. . VK7AB VK7AB VK7AB -.-
  - .- 4S7XX 4S7XX -.. . VK7AB VK7AB
  - .- 4S7XX -.. . VK7AB -.. -
  - 4S7XX 4S7XX DE VK7AB VK7AB VK7AB
12. You heard your own call sign 4S7YY but was unable to read the call sign of the calling station. Your reply in radio telegraphy would be
- .- QRZ ..--- QRZ ..--- QRZ ..--- QRZ ..--- -.. . 4S7YY 4S7YY  
4S7YY -.-
  - .- QRZ QRZ QRZ -.. . 4S7YY 4S7YY -.-
  - 4S7YY 4S7YY 4S7YY QRZ ?
  - QRZ DE 4S7YY 4S7YY
13. Which uses the correct phonetic alphabet for the word “SYNC” ?
- SARAH YORK NELLIE CHAARLIE
  - SERRA YANKEE NOVEMBER CHARLIE
  - SIERRA YANKEE NOVEMBER CHARLIE
  - SARAH YANKEE NOVEMBER CHARLIE
14. Which uses the correct phonetic alphabet for the word “HARD” ?
- HARRY ARTHUR ROBERT DAVID
  - HOTEL ARTHUR ROMEO DELTA
  - HOTEL ALFA ROMEO DAVID
  - HOTEL ALFA ROMEO DELTA
15. Which uses the correct phonetic alphabet for the word “POUR” ?
- PAPA OLIVER UNCLE ROBERT
  - PAPA OSCAAR UNIFORM ROMEO
  - PETER OLIVER UNIFORM ROMEO
  - PETER OSCAR UNCLE ROBERT
16. Meaning of the abbreviation “BQ” is
- reply to a request.
  - break
  - signal to mark the separation between different parts of the same transmission.
  - signal used to interrupt a transmission in progress.
17. The meaning of the abbreviation “RQ” is
- received.
  - repeat.
  - indication of a request.
  - refer to.
18. The meaning of the abbreviation “ $\overline{VA}$ ” is
- stop transmission
  - end of work.
  - waiting period
  - closing station.

19. The meaning of the Q Code “QRT” is
- (a) shall I stop sending ?
  - (b) are you busy ?
  - (c) Shall I decrease transmitter power ?
  - (d) Shall I send more slowly ?
20. The meaning of the Q Code “QSP” is
- (a) shall I repeat the call on the calling frequency?
  - (b) will you relay to ?
  - (c) can communicate with ?
  - (d) can you acknowledge receipt ?
21. Class of emission designated by F3E is
- (a) Amplitude Modulated, Double sideband, a single channel.
  - (b) Frequency Modulated, single channel containing Analog information Telephony.
  - (c) Frequency Modulated, single channel containing digital information Morse telegraphy.
  - (d) Frequency Modulated, single channel containing digital information without the use of a modulating sub-carrier – Morse Telegraphy.
22. A signal readable with no difficulty , signal strength fairly good, of musically modulated tone is designated in RST code as
- (a) 545
  - (b) 544
  - (c) 455
  - (d) 546
23. RST code 466 denotes a signal readable with
- (a) practically no difficulty, moderately strong signal, musically modulated tone.
  - (b) practically no difficulty, fairly good signal, moderately musical
  - (c) practically no difficulty, near d.c. note, smooth ripple.
  - (d) practically no difficulty, good signal, modulated note, slight trace trace of whistle.
24. Amateur station log book should contain only the following most important information.
- (a) day month year, call sign of the called station, location and signature of radio amateur only.
  - (b) day month year, frequency band used, location and signature of amateur operator.
  - (c) day month year, the beginning and end of radio communication in UTC, call sign of the called station, frequency band used, class of emission.
  - (d) frequency band used, class of emission and power used, and the location.

25. Regarding the keeping of a log book of an amateur radio station following NEED NOT BE OBSERVED.
- (a) Log book shall be kept with consequently numbered pages.
  - (b) It must repeat the entries regarding day month year, frequency band used, Signature of the amateur radio operator for every entry made.
  - (c) Shall be kept at least one year from the date of the last entry.
  - (d) Entry must be made in indelible ink.

### Answers

1. b	2. c	3. a	4. d	5. a
6. b	7.??	8. a	9. c	10. d
11. d	12. d	13. c	14. d	15. b
16. a	17. c	18. b	19. a	20. b
21. b	22. c	23. d	24. c	25. b

Q-7 correct answer is not available.

Correct answer is Licence and Log book

There is no "certificate of competence" in amateur radio

Q-8 Question may be wrong. **During the absence of the licence holder**, no one can enter the station.

Q-10 No correct answer. In amateur radio CW QSO no starting signal used  
The person sets the question has no idea about CW QSOs.

Q-16 "BQ" is not use in amateur radio (out of syllabus)

Q-17 "RQ" is not use in amateur radio (out of syllabus)