Chapter 14

SAMPLE PAPER 1

ELECTRICS AND AUTOFLIGHT

The following sample exam paper is similar in format to that produced by the UK CAA International Division and you should anticipate having to answer the 40 questions in 40 minutes.

1. What is the electrolyte in a lead acid battery?

   (a) dilute sulphuric acid
   (b) hydrochloric acid diluted with distilled water
   (c) lead compound in liquid acidic suspension

2. Where is a TRU used?

   (a) to provide a suitable AC from a DC BUS BAR
   (b) between an AC supply and a DC BUS BAR
   (c) to convert 115VAC 400HZ to 26VAC 400HZ

3. What does an Ammeter measure?

   (a) EMF in volts
   (b) current in Amps
   (c) frequency in Hertz.

4. In the cockpit, how can you check the charge state of battery?

   (a) by the use an hydrometer
   (b) by checking the voltmeter in the “off-load” condition
   (c) by switching on a reasonable load and checking that the voltmeter indicates the rated voltage.

5. Is it satisfactory to have two unparalleled generators that are not in phase?

   (a) no, as a phase incomparability will cause a malfunction
   (b) yes, because the BTBs will protect the circuits
   (c) yes, provided they supply separate systems

6. When load shedding takes place,

   (a) voltage reduces at the bus bar
   (b) field current increases
   (c) current at the bus bar reduces

7. If one phase of a 3 phase AC motor circuit opens, the

   (a) motor will stop immediately
   (b) motor will continue to run at a lower RPM, producing less power
   (c) motor will slow down and stop

8. What does open circuiting do?

   (a) will isolate the power from the component
   (b) will increase the power to the component
   (c) will simply switch that component ON

9. One purpose of bonding, is to?

   (a) connect one electrical component to another
   (b) create a low resistance path for the discharge of static electricity
   (c) ensure all the bus bars are of the same potential

10. A pilot excitor is :

   (a) a small separate D.C. coil used to excite the main A.C. generator.
   (b) a generator excitor coil operated by an impulse mechanism.
   (c) any object of arousal that appeals to a pilot's random impulses.

11. Power Factor is defined as :-

   (a) the sum of true and reactive power.
   (b) the ratio between true power and apparent power.
   (c) the ratio between inductive and capacitive power reactance .

12. The line voltage of a three-phase star-connected AC. is :-

   (a) less than phase voltage.
   (b) greater than phase voltage.
   (c) equal to phase voltage.

13. The output frequency of an AC generator is governed by :-

   (a) controlling the strength of the magnetic field.
   (b) changing the number of windings in the field coils.
   (c) controlling the RPM of the armature.

14. The purpose of a CSD is:-

(a) to allow the generator to run at a constant speed with changing engine RPM,
(b) to provide the engine with a constant load,
(c) to assist the voltage regulation function.

15. Heaters and electrical de-icing systems can be supplied by frequency wild AC supplies, after voltage regulation because:-

(a) resistance is not affected by frequency,
(b) these circuits contain reactive components,
(c) this method saves a lot of DC.

16. A static inverter is a :-

(a) solid state device which converts DC to AC.
(b) rotary device which is fixed to the airframe and cannot be moved.
(c) is simply a DC motor turning an alternator.

17. Two 24 volt 20 AH batteries connected in parallel will provide :-

(a) 48 v 10 AH
(b) 24 v 40 AH.
(c) 12 v 80 AH

18. Fuses and circuit breakers are placed :-

(a) in parallel with its component,
(b) in series with its component,.
(c) in either series or parallel with its component.

19. The field excitation current for AC. generators is :-

(a) DC. and may be varied to control output voltage.
(b) AC. and therefore cannot be varied to control output voltage.
(c) AC. and may be varied to control output voltage.

20. On an aircraft fitted with an earth return electrical system:-

(a) static electricity is discharged through the tyres on landing
(b) one lead from the battery and each component is connected to the metal airframe.
(c) capacitive devices may suffer from over-voltage

21. Semiconductors are sometimes called:

a) one way valves
b) inverters
c) solid state devices

22. Computers using binary code are known as:

a) analogue Computers
b) digital Computers
c) linear Computers

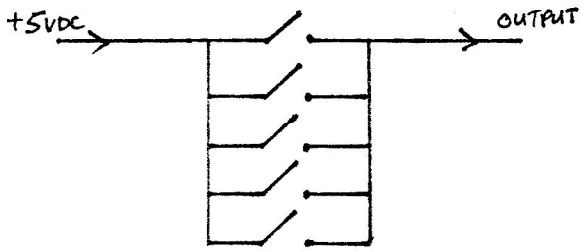
23. In logic circuits, semi conductors are used as:

a) power amplifiers
b) current storage devices
c) electronically controlled switches

24. Convert binary code 10001 to a decimal number.

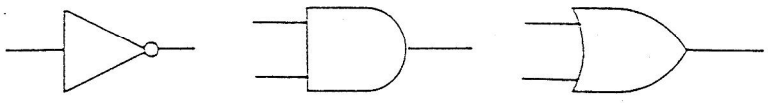
a) 11
b) 17
c) 31

25. What logic gate does the following diagram represent?



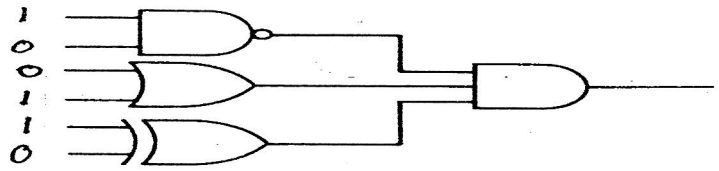
a) OR gate
b) NAND gate
c) AND gate

26. The correct descriptions of the logic symbols shown in order are:



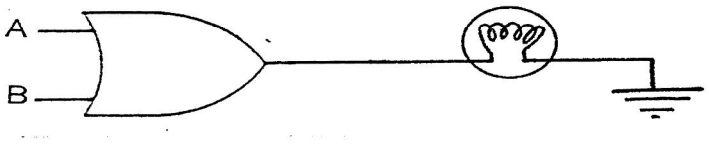
a)	AND	NOT	OR
b)	NOT	NAND	NOR
c)	NOT	AND	OR

27. Using the inputs as indicated, what is the output of the following diagram?



a) 0
b) 1
c) 2
d) 3

28. In order to switch off the lamp in the diagram below, the inputs must be:



a) A = 1, B = 0
b) A = 1, B = 1
c) A = 0, B = 0

29. The NAND Function is achieved with the use of:

a) a NOT Gate and an OR Gate
b) a reversed AND Gate
c) a NOT Gate and AND Gate
d) an AND Gate and an OR Gate

30. On a small aircraft, auto pilot pitch and roll signals are supplied from:

a) the auto pilots' own gyros
b) pick offs from the aircraft Flight Attitude Indicator
c) the turn and balance instrument

31. The pitch trim thumb wheel is operative only when:

a) the auto pilot is engaged.
b) heading mode only is engaged.
c) altitude hold is engaged.
d) the electric trim is off.

32. When disengaging the auto pilot the:

a) vacuum system must be at least 4.2” Hg
b) hydraulic pumps should be turned off
c) aircraft controls should be held firmly

33. The main purpose of an auto pilot is to:

a) provide a smooth flight at all times
b) respond to radio communications
c) relieve pilot workload
d) provide full automatic takeoff and landing capability

34. When altitude hold is engaged, the aircraft:

a) will maintain the pitch attitude at time of engagement
b) heading mode must be engaged first
c) will sense pressure changes and maintain the pressure altitude selected
d) pitch gyro must be engaged

35. When using the Flight Director the pilot should:

a) constantly trim the aircraft
b) either engage the auto pilot or fly the FD commands
c) relax and increase his lookout for other aircraft
d) ensure the auto pilot is disengaged

36. In a large aircraft if the aircraft is off the ILS track, what signals does it use to regain track?

a) VOR and LOC only
b) Localizer only
c) VOR only

37. The colour code for a cautionary message on an EFIS display is:

a) red
b) amber
c) magenta

38. On the EHSI, in what modes is RADAR available?

a) MAP, PLAN, ILS
b) PLAN, ILS, VOR
c) ILS, VOR, MAP

39. AUTOLAND always requires:

a) three autopilots to function
b) two automatic systems which continuously compare ILS deviation and RA data
c) altitude hold to be engaged

40. Go-around (GA) may be initiated by:

a) switching the autopilot off
b) pressing the GA button on one of the throttle levers
c) selecting FD only

SAMPLE PAPER 2

ELECTRICS AND AUTOFLIGHT

The following sample exam paper is similar in format to that exam produced by the UK CAA International Division and you should anticipate having to answer the 40 questions in 40 minutes. A final tip - study hard and be nice to your mum!

1. What is one way to check the charge of a battery?

   (a) check the voltmeter in the “off-load” condition
   (b) pare on load and off load voltage
   (c) use the ammeter indicator before start

2. In a star connected three phase generator:

   (a) phase voltage is less than line voltage
   (b) line current is greater than phase current
   (c) phase voltage is greater than line voltage

3. What happens when a fuse wire blows?

   (a) the increased current flow is likely to cause a fire
   (b) a circuit breaker should also break the circuit
   (c) the fuse wire melts and separates

4. When should a circuit breaker be reset?

   (a) immediately it is noticed to have popped
   (b) after the fault has been corrected
   (c) only when the aircraft is safely on the ground

5. When can AC voltage from frequency wild generators be parallel?

   (a) never
   (b) only when heaters are connected
   (c) always

6. What could be the effect if frequency decreases in an inductive circuit?

   (a) the circuit impedance would increase
   (b) no obvious change would occur unless the voltage changes
   (c) the components may overheat

7. How is voltage from an AC generator increased to its regulated value ?

(a) by increasing the speed of rotation (RPM)
(b) by increasing the magnetic field strength in the generator
(c) by decreasing the load on the bus bar

8. With a NICAD battery, after start you notice a large positive charge rate;

(a) this is normal provided this first charge is not prolonged
(b) this is dangerous, the system must be shut down immediately
(c) the engine must be stopped

9. Static inverters may be used to supply :

(a) emergency constant frequency A.C.
(b) emergency constant frequency D.C.
(c) emergency frequency wild A.C.

10. Three Phase induction motors are used :

(a) to provide small amounts of power to operate clocks
(b) to operate devices requiring large amounts of power
(c) only as inverters

11. Power Factor in a circuit with an imbalance of inductance and capacitance is :-

(a) greater than unity. (> 1).
(b) unity (= 1).
(c) less than unity (< 1).

12. The output voltage of an AC generator is usually controlled by :-

(a) controlling the strength of the magnetic field..
(b) changing the number of windings in the field coils.
(c) controlling the RPM of the armature.

13. The armature of a brushless generator contains :-

(a) the output windings.
(b) the rotating field and diodes.
(c) either sliprings or a commutator.

14. Malfunction of a CSD requires :-

(a) automatic electrical disconnection of the generator drive,
(b) manual disconnection by operation of the generator drive,
(c) the generator drive shaft to shear.

15. The opposing potential in AC circuits (and changing DC circuits) is known as :-

(a) PD.
(b) Forward EMF.
(c) Back EMF.

16. Frequency wild alternators :-

(a) are often connected in parallel.
(b) can be connected in either series or parallel.
(c) are never paralleled.

17. The capacity of a battery is determined by :-

(a) the area of its plates,
(b) the applied load,
(c) its discharge rate.

18. A type of AC motor whose running speed is directly related to the frequency of the supply voltage is a :-

(a) universal type.
(b) squirrel cage type.
(c) synchronous type.

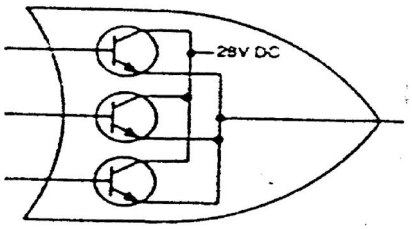
19. If the inductive reactance decreases due to under-frequency in an AC. supply:-

(a) inductive devices may overheat.
(b) AC. motors may over speed.
(c) capacitive devices may suffer from over-voltage.

20. Press to test lights are used:-

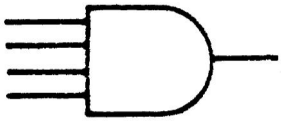
(a) to indicate to the pilot that the circuit has power,
(b) to indicate to the pilot that the circuit has no power,
(c) to indicate to the pilot that the circuit has malfunctioned.

21 What logic gate does the 'common emitter circuit' diagram below represent?



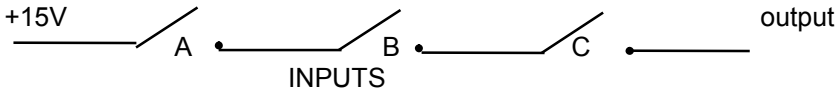
a) AND gate
b) OR gate
c) NOR gate

22. What type of logic gate does the following symbol represent?



a) AND gate
b) OR gate
c) NOR gate

23. A set of switches in series as depicted below represents what type of logic?



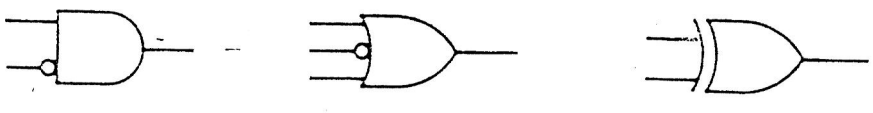
a) AND gate
b) OR gate
c) NOR gate

24. Convert binary code 10011 to a decimal number:

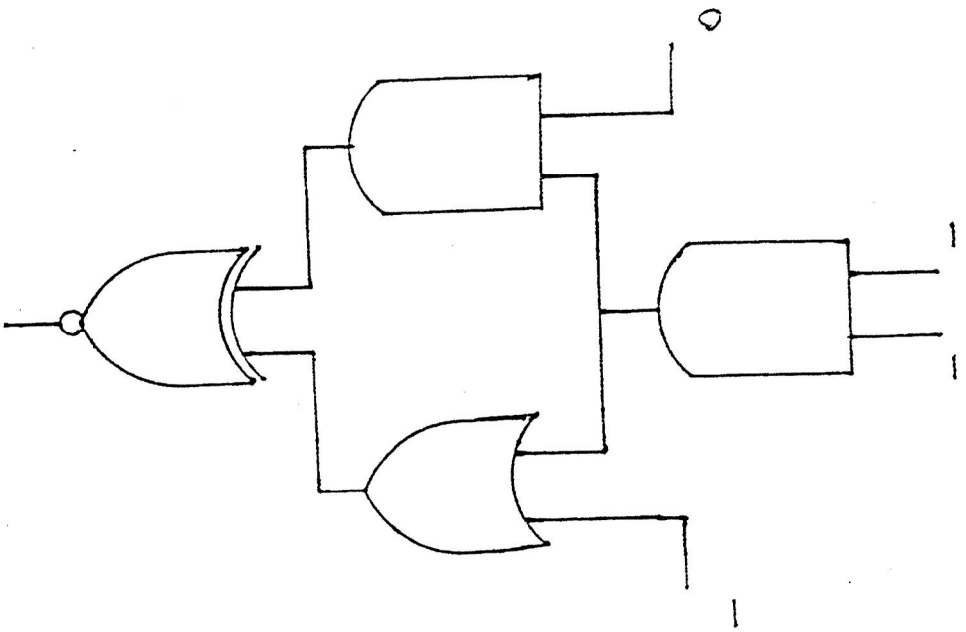
a) 33
b) 19
c) 11

25. Select the diagram that represents an EX-OR gate:

a) b) c)



26. The output of the following diagram using the inputs as indicated is:



a) 0
b) 1
c) 2

27. In small aircraft what type of gyroscope is used to determine the aircraft attitude?

a) a rate gyro
b) a lazer gyro
c) a vertical gyro

28. The basic autopilot in a small aircraft receives its pitch and roll signals form:

a) the turn indicator
b) the artificial horizon
c) the HSI

29. The ‘quick disengage’ switch for the autopilot is normally on the:

a) control handle
b) throttle
c) ADC

30. When compared to analog computers, digital computers are:

a) heavier, cheaper, software activated but cannot share information easily
b) slower, more accurate and present information in a much nicer format
c) lighter, cheaper and can easily transmit and share data

31. Autopilots on large aircraft receive attitude information from rate gyroscopes which are part of the:

a) CADC
b) PFD
c) IRS

32. From where does the autopilot LOC capture mode receive its input?

a) LOC only
b) LOC and course error signals
c) LOC and heading signals

33. In the HDG SELECT mode, bank limit signals are input to?

a) roll attitude gyro outputs
b) reset heading output signals
c) control the position indicators signals

34. What is ‘course washout’?

a) autopilot correcting for x-wind on finals
b) the autopilot making a smooth transition to the localiser before capture
c) autopilot heading error signals increasing

35. What autopilot modes function in the pitch channel?

a) VNAV, ALT, AUTOTRIM, AUTOTHROTTLE
b) LNAV, HDG, LOC, AUTOLAND
c) YAW DAMPER, ROLL TRIM.

36. If the EADI is receiving invalid information, what are the indications?

a) a white flashing screen with a red display
b) a blank screen
c) an amber flag, no display and a blank screen

37. What is the more sensitive mode, for an approach for landing?

a) ADF
b) VOR
c) ILS

38. What planes of an aircraft in flight does ‘dutch roll’ affect?

a) YAW and PITCH
b) PITCH and ROLL
c) ROLL and YAW

39. How is the expanded compass rose selected on the EHSI?

a) by pressing the expand/normal switch on the EHSI
b) by adjusting the scale selection on the EHSI control panel
c) by selecting the expanded mode of the required display

40. At take-off which of the following equipment or modes will be operating?

a) AUTOLAND
b) FLIGHT DIRECTOR
c) AUTOPILOT

ANSWERS

Chapter 7
Sample questions

1C	21A
2A	22B
3C	23C
4B	24B
5C	25B
6B	26C
7B	27C
8C	28C
9C	29C
10B	30B
11B	
12C	
13A	
14A	
15B	
16A	
17C	
18A	
19A	
20C	

Chapter 13
Sample Questions

1B	21A
2C	22A
3C	23C
4A	24B
5D	25C
6B	
7B	
8B	
9A	
10A	
11C	
12A	
13C	
14C	
15C	
16C	
17A	
18B	
19A	
20B	

Chapter 14
Sample Paper 1

1A	21C
2B	22B
3B	23C
4C	24B
5C	25A
6C	26C
7B	27B
8A	28C
9B	29C
10A	30B
11B	31D
12B	32C
13C	33C
14A	34C
15A	35B
16A	36B
17B	37B
18B	38C
19A	39B
20B	40B

Chapter 14
Sample Paper 2

1B	21B
2A	22A
3C	23A
4B	24B
5A	25C
6C	26A
7B	27C
8A	28B
9A	29A
10B	30C
11C	31C
12A	32C
13B	33A
14C	34B
15C	35A
16C	36C
17C	37C
18C	38C
19A	39C
20A	40B