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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022

COURSE NAME : INSTRUMENTS
COURSE CODE : BDT 40602
PROGRAMME CODE : BDC
EXAMINATION DATE : JULY 2022
DURATION : 2 HOURS
INSTRUCTION : 1. ANSWER **ALL** QUESTIONS.
2. THIS FINAL EXAMINATION IS
CONDUCTED VIA **CLOSED BOOK**.
3. STUDENTS ARE **PROHIBITED** TO
CONSULT THEIR OWN MATERIAL OR
ANY EXTERNAL RESOURCES
DURING THE EXAMINATION
CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **ELEVEN (11)** PAGES

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- Q1** Determine the effect of blocked pitot when an aircraft is descending.
- A lower nose – aircraft stalls
 - B lower nose – exceed V_{ne}
 - C raise nose – exceed V_{ne}
 - D raise nose – aircraft stalls
- (1 mark)
- Q2** Determine the effect of blocked static port when an aircraft is climbing.
- A lower nose – aircraft stalls
 - B lower nose – exceed V_{ne}
 - C raise nose – exceed V_{ne}
 - D raise nose – aircraft stalls
- (1 mark)
- Q3** Determine the effect of blocked static port when an aircraft is descending.
- A lower nose – aircraft stalls
 - B lower nose – exceed V_{ne}
 - C raise nose – exceed V_{ne}
 - D raise nose – aircraft stalls
- (1 mark)
- Q4** Determine the effect of blocked pitot tube when an aircraft is climbing.
- A raise nose – aircraft stalls
 - B lower nose – exceed V_{ne}
 - C lower nose – aircraft stalls
 - D raise nose – exceed V_{ne}
- (1 mark)
- Q5** Select which of the following instruments are connected to the pitot-static.
(Choose 3 options)
- altimeter.
 - air-operated directional gyro.
 - vertical speed indicator.
 - airspeed indicator.
- (1 mark)
- Q6** Temperature play a significant part in flight planning, aerodynamics, and aircraft performance. Knowing _____ is important in aviation and can be obtained by applying corrections to the thermometer.
- A Static Air Temperature.
 - B Ram Air Temperature.
 - C Total Air Temperature.
 - D Dynamic Air Temperature.
- (1 mark)

- Q7** Identify the importance of fuel flow systems in any aircraft.
- A To move fuel from fuel truck into fuel tanks.
 - B To move fuel from combustion chamber into fuel tanks.
 - C To move fuel from engine into fuel tanks.
 - D To move fuel from fuel tanks into combustion chamber.
- (1 mark)
- Q8** Select the appropriate functions of a fuel vent.
(Choose 4 options)
- To maintain atmospheric pressure within the tanks
 - To prevent air locks
 - To prevent icing from occurring
 - To allow fuel overflow
 - To vent vapor that formed in the system
 - As an emergency point for fueling
- (1 mark)
- Q9** Select the systems used to mix air and fuel for ignition in the combustion chamber.
(Choose 2 options)
- Gravitational system
 - Carburetor system
 - Fuel injection system
 - Pressure pump system
- (1 mark)
- Q10** Identify which of the following are advantages using fuel injection system.
(Choose 3 options)
- Correct mixtures can be maintained at all times
 - Cold start is easier and backfiring is impossible
 - Reliable & simple construction
 - Faster and smoother throttle response
 - Cold start is harder and backfiring is possible
- (1 mark)
- Q11** Identify the various types of tachometers.
- A Magnetic, capacitance, electronic.
 - B Electrical, mechanical, density.
 - C Magnetic, electrical, helical.
 - D Mechanical, electrical, magnetic.
- (1 mark)
- Q12** The magnetic tachometer sensor is composed of:
- A a drag cup rotating in front of an electro-magnet.
 - B the rotor of a three-phase AC generator.
 - C the rotor of a single phase AC generator.
 - D a circular magnet with four poles.
- (1 mark)

- Q13** Identify the task of the generator in an electrical tachometer.
- A to feed directly a voltmeter.
 - B to feed directly a rotating shaft.
 - C to feed directly a galvanometer.
 - D to feed a synchronous motor turning a drag cup.
- (1 mark)
- Q14** List the components of magnetic tachometer:
- A a permanent rotating magnet turning inside a non-magnetic drag cup.
 - B a single-phase generator connected to a asynchronous motor.
 - C a three phase generator connected to a synchronous motor.
 - D a single-phase generator connected to a synchronous motor.
- (1 mark)
- Q15** Determine errors associated to the Machmeter.
- A instrument and compressibility only.
 - B instrument, pressure, and temperature only.
 - C position, instrument, and manoeuvre induced.
 - D those of a Machmeter only.
- (1 mark)
- Q16** Choose the data outputs from the ADC (Air Data Computer).
(Choose 4 options)
- Altitude.
 - Mach number.
 - Total Air Temperature.
 - True Air Speed.
 - Static Air Temperature.
- (1 mark)
- Q17** Select the correct statement for Air Data Computer (ADC).
- A transforms air data measurement into electric impulses driving servo motors in instruments.
 - B measures position error in the static system and transmits this information to ATC to provide correct altitude reporting.
 - C converts air data measurements given by ATC from the ground in order to provide correct altitude and speed information.
 - D is an auxiliary system that provides altitude information in the event that the static source is blocked.
- (1 mark)
- Q18** The tachometer indicates:
(Choose 2 options)
- The speed of the camshaft of a reciprocating engine
 - The speed of the crankshaft of a reciprocating engine
 - The speed of the compressor section of gas turbine engine
 - The speed of the turbine section of gas turbine engine
- (1 mark)

- Q19** Machmeter works in the same principle as Air Speed Indicator except:
A the speed is relative to the speed of sound
B the speed is related to the static pressure
C the speed is related to the outside air temperature
D the speed is related to the speed of light
(1 mark)
- Q20** Pick the correct statement regarding Air Data Computer.
A complicated design, improved displays, and reduced errors.
B central source for other system, clean design, and give out failure warning.
C hard to decode display, permits error correction, and connector for other main systems.
D permits error correction, improved displays, and hard to decode display.
(1 mark)
- Q21** Gyro begins to cause precession when:
A a force is applied at 180° or parallel to its rotational axis.
B the speed of the gyro increases.
C the speed of the gyro decreases.
D a force is applied at right angles to its rotational axis.
(1 mark)
- Q22** Determine the instrument that use rate gyro
A directional gyro indicator.
B turn co-ordinator.
C artificial horizon.
D attitude indicator.
(1 mark)
- Q23** If the needle and the ball of a Turn and Slip indicator both show right, what does it indicate:
A turn to right and too much bank.
B turn to left and too much bank.
C turn to right and too little bank.
D turn to left and too little bank.
(1 mark)
- Q24** When an aircraft has turned 270° with a constant attitude and bank, the pilot observes the following on a classic (air driven) artificial horizon:
A too much nose up and bank too high.
B too much nose up and bank correct.
C attitude and bank are correct.
D too much nose up and bank too low.
(1 mark)
- Q25** Pick the incorrect statement regarding electrically driven Attitude Indicator.
A Fast spin speed give greater rigidity and less precession
B Constant spin speed at all altitude regardless of air density
C Opened case thus affected by moisture, dust and corrosion
D Runs at constant temperature which improve accuracy
(1 mark)

- Q26** Determine the angle of magnetic variation at any point on the Earth's surface.
- A Between the horizontal component of the magnetic field and True North direction.
 - B Between the compass needle and the local vertical.
 - C Between the compass needle and the horizon.
 - D Made by a compass needle during a steady turn.
- (1 mark)
- Q27** A pilot wishes to turn right on to a northerly heading with 20° bank at a latitude of 40° North. Using a direct reading compass, in order to achieve this he must stop the turn on to an approximate heading of:
- A 330°
 - B 180°
 - C 030°
 - D 360°
- (1 mark)
- Q28** Determine the indication of a direct reading magnetic compass during deceleration following a landing in a southerly direction, in the northern hemisphere.
- A an apparent turn to the west.
 - B an apparent turn to the east.
 - C no apparent turn only on northern latitudes.
 - D no apparent turn.
- (1 mark)
- Q29** When an aircraft on a westerly heading on the northern hemisphere accelerates, determine the effect of the acceleration error on the magnetic compass.
- A the compass indicates a turn towards the North.
 - B the compass turn faster than the actual turning rate of the aircraft.
 - C the compass lags behind the turning rate of the aircraft.
 - D the compass indicates a turn towards the South.
- (1 mark)
- Q30** Identify the deviation.
- A the relationship between True North with Magnetic North.
 - B the relationship between Compass North with Magnetic North.
 - C the relationship between Compass North with True North.
 - D none of the above.
- (1 mark)
- Q31** Control Display Unit (CDU) are individually, colour coded indicator. Select the correct statement from below.
- A Red – indicate trouble of a less urgent.
 - B Amber – signifies a serious problem requiring immediate crew action.
 - C Blue or white – is usually reserved for lights that are informational.
 - D Amber – no action required to rectify the problem.
- (1 mark)
- Q32** Identify the type of database in Flight Management System.
- A Navigation
 - B Instructional
 - C Engine
 - D Computer
- (1 mark)

- Q33** Choose the information which is/are NOT related to Performance Database in Flight Management System.
- A Fuel weight, Cargo/pax weight.
 - B Center of gravity.
 - C Assigned altitude.
 - D Airports, runways, holding patterns.
- (1 mark)
- Q34** Determine the main function of a Flight Management Systems (FMS).
- A To provide consolidated navigation and auto flight control which maximizes aircraft and route efficiency.
 - B To automatically planned route based departure and destination aerodrome.
 - C To keep the aircraft capabilities at minimum efficiency.
 - D To aid pilots on ground when an emergency occurs.
- (1 mark)
- Q35** Pick the incorrect statement about Multi Function Display (MFD).
- A Gives information on navigation, route, moving map, weather radar.
 - B Acts as backup for PFD in case where PFD lost power or become unreliable at any stage of flight.
 - C Acts as primary screen before PFD and will revert to PFD when MFD lost power or become unreliable at any stage of flight.
 - D Provides ground proximity warning system, traffic collision avoidance system, and airport information all on the same screen.
- (1 mark)
- Q36** Flight deck instrument display system such as EFIS used electronic display rather than electromechanical. Choose the appropriate technology used inside EFIS.
- A Light Emitting Diode (LED)
 - B Cathode Ray Tube (CRT)
 - C Organic Light Emitting Diode (OLED)
 - D Laser Phosphor Display (LPD)
- (1 mark)
- Q37** Information that are related to Navigation Database in Flight Management System are as follow, except:
- A Waypoints
 - B Airways/ Routes
 - C Assigned altitude.
 - D Airports, runways, holding patterns.
- (1 mark)
- Q38** Automatic Flight Director Systems (AFDS), which includes auto-thrust or known as auto throttle can be operated using _____ system.
- A Tactical Operation.
 - B Independent Operation.
 - C Planned Operation.
 - D Navigational Operation.
- (1 mark)

- Q39** Determine the aims of Strategic Operation in Automatic Flight Director Systems.
- A Simpler form of automation which used manual input by flight crew.
 - B Aim to achieve a longer term goal.
 - C For achieving a specific short term objective.
 - D Basic inputs (heading, speed, altitude) are entered to achieve the required/selected parameters (pitch attitude, thrust).
- (1 mark)
- Q40** Choose the working modes of throttle operation.
(Choose 2 options)
- Thrust mode.
 - Brake mode.
 - RPM mode.
 - Speed mode.
- (1 mark)
- Q41** Determine main attributes when using Tactical Operation in Automatic Flight Director Systems.
- A The aircraft will automatically fly a selected profile and these profiles can be modified by the Flight Crew .
 - B Aim to achieve a longer term goal.
 - C For achieving a specific short term objective.
 - D This operations typically can control all phases of flight (takeoff, en route, approach, landing) with full engine thrust management.
- (1 mark)
- Q42** State the telecommunication technique which is used by FANS.
- A HF/ADF
 - B ADF
 - C HF
 - D VHF/SATCOM
- (1 mark)
- Q43** Determine the purpose of FANS concept which has been developed by ICAO.
- A to provide a safe, efficient and cost-effective communication system.
 - B to effectively monitor information concerning aircraft system status and fuel consumption.
 - C to automate the distribution of departure slots.
 - D to allow a safe and efficient use of a given volume of airspace by the maximum possible number of aircraft.
- (1 mark)
- Q44** Identify the situation which is not a type of communication breakdown.
- A Cockpit interference.
 - B Radio interference.
 - C Blocked Transmission.
 - D Call-sign Confusion.
- (1 mark)

- Q45** Describe direct emergency communication.
- A communication loop in between flight crew and airport rescue and fire fighting service with ATC in active position.
 - B communication loop in between ATC, and flight crew.
 - C communication loop in between ATC and airport rescue and fire fighting service.
 - D communication loop in between flight crew and airport rescue and fire fighting service while ATC in passive position.
- (1 mark)
- Q46** Explain the advantage of direct emergency communication.
- A Very easy to revert to the standard communication loop with the controller assuming the mediator role.
 - B A slower information exchange.
 - C Reduced situational awareness.
 - D Increased risk for the passengers during an evacuation.
- (1 mark)
- Q47** Identify types of operation provided by Future Air Navigation System (FANS).
(Choose 2 options)
- Positive control
 - Negative control
 - Procedural control
 - Navigational control
- (1 mark)
- Q48** Describe Procedural Control in FANS.
- A Used in areas which have radar, commonly referred to as radar control.
 - B Used in areas (oceanic or land) which do not have radar.
 - C Separation standards are less.
 - D Used in areas which have military radar.
- (1 mark)
- Q49** State the meaning of the abbreviation TAWS.
- A Terrain Awareness Warning System
 - B Terrain Avoidance Warning System
 - C Terrain and Weather Shun
 - D Traffic and Weather Shun
- (1 mark)
- Q50** Pick the correct statement on TAWS Class A.
- A required for all except the smallest commercial air transport aircraft.
 - B required by larger General Aviation (GA) aircraft and recommended for smaller commercial or GA aircraft.
 - C required by aerobatic aircraft.
 - D required for ground movement vehicle.
- (1 mark)

- Q51** Choose two divisions of Safety Nets.
(Choose 2 options)
- Ground based
 - Airborne
 - Oceanic
 - Underground
- (1 mark)
- Q52** State the maximum warning duration provided by Airborne safety nets.
- A 1 minutes.
 - B 40 seconds.
 - C 10 seconds.
 - D 5 minutes.
- (1 mark)
- Q53** State the maximum warning duration provided by Ground based safety nets.
- A 10 minutes.
 - B 40 seconds.
 - C 10 seconds.
 - D 2 minutes.
- (1 mark)
- Q54** Name a system inside the aircraft that is belong to Airborne safety nets.
- A Short Term Conflict Alert (STCA)
 - B Area Proximity Warning (APW)
 - C Terrain Avoidance and Warning System (TAWS)
 - D Minimum Safe Altitude Warning (MSAW)
- (1 mark)
- Q55** Stall warning requirements for transport category aircraft must begin at a stall speed which exceeds the stall speed by a certain rate. State the rate in knots.
- A minimum at 5
 - B not less than 5
 - C more than 5
 - D in between 5 to 10
- (1 mark)
- Q56** Based on the options below, pick the one which is not a type of stall warning systems.
- A Post-stall Buffet
 - B Pre-stall Buffet
 - C Audible Warning
 - D Stick Shaker
- (1 mark)
- Q57** Determine the purpose of a Flight Data Recorder (FDR).
- A Recording of cockpit sounds for incident and accident investigations.
 - B Serving as evidence for insurance issues following personal injury or serious material damage.
 - C Collection of altitude, heading, speeds etc. for investigation of an accident.
 - D Monitoring of flight parameters for maintenance purposes.
- (1 mark)

- Q58** State the usual location of flight data recorder in transport category aircraft.
- A In the wing.
 - B In the cockpit.
 - C In the tail.
 - D In an engine.
- (1 mark)
- Q59** Determine the purpose of a Cockpit Voice Recorder (CVR).
- A Recording of cockpit sounds for incident and accident investigations.
 - B Serving as evidence for insurance issues following personal injury or serious material damage.
 - C Collection of altitude, heading, speeds etc. for investigation of an accident.
 - D Monitoring of flight parameters for maintenance purposes.
- (1 mark)
- Q60** State the time at which the operation of sensors for deployment of Automatic Deployable Flight Recorder begins.
- A the start of a crash
 - B 1 minutes before the start of a crash
 - C 1 minutes after the start of a crash
 - D 30 seconds after the start of a crash
- (1 mark)

- END OF QUESTIONS -

