DEPARTMENT OF SURVEYING AND GEOINFORMATICS
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
OBAFEMI AWOLOWO UNIVERSITY

2019/2020 ACADEMIC SESSION **RAIN SEMESTER**

SVG 202: LARGE SCALE SURVEYING EXAMINATION

TimeAllowed: 2 hours

ANSWER ANY 3 QUESTIONS

1a. The table below gives the final coordinates of a computed traverse observation. Determine the bearings, distances,angles subtended between the traverse lines and the total area covered by the traverse. **15 mks**

EASTING (m)	NORTHING (m)	STATION
645543.437	876965.527	PL4
645576.812	876969.117	PL5
645575.295	876984.709	PL6
645576.812	876969.117	PL7
645543.437	876965.527	PL4

1b. Define the following terms

a. Traverse stations
b. Traverse legs
c. Reduced level
d. Datum
e. Bench mark **5 mks**

2a. Control survey is usually carried out as reference base for future surveys along both horizontal and vertical datum. Traditionally, methods of triangulation, trilateration, traversing, Global Positioning System (GPS) or a combination of any of these techniques may be used. Describe a systematic procedure of how you would determine positions along X and Y component axes (Northings and Eastings) using any of these method. **10 mks**

2b. Determine the missing values from GPS control survey on the computation table below.
Recall that $N_B = N_A + L\cos\Theta$ and $E_B = E_A + L\sin\Theta$ for any traverse line. **10 mks**

Station From	Bearing			Distance (m)	ΔN (LCOSΘ)	ΔE (LSINΘ)	Northings	Eastings	Station To
							825339.245	673072.708	OCSF109S
OCSF109S	150°	51′	49″	414.259	-361.840	201.699	?	673274.407	OCSF110S
OCSF110S	154°	12′	25″	416.275	-374.801	?	824602.604	673455.539	OCSF111S
OCSF111S	158°	10′	49″	499.339	?	185.600	?	?	OCSF112S
OCSF112S	175°	26′	12″	180.582	-180.009	?	823959.030	673655.507	OCSF113S
OCSF113S	185°	07′	05″	369.053	-367.582	-32.922	823591.448	673622.585	OCSF114S
OCSF114S	158°	08′	53″	266.181	?	?	?	673721.661	OCSF115S
OCSF115S	139°	31′	11″	803.988	-611.536	521.939	822732.857	?	OCSF116S
OCSF116S	120°	13′	27″	533.676	-268.643	461.130	822464.214	674704.730	OCSF117S

3a. Define the following terms:

a. Accuracy
b. Precision
c. Most Probable Value
d. Root Mean Square Error
e. Standard deviation **10mks**

3b. Tachometry surveying adopts the principle of isosceles triangle todetermine both horizontal and vertical distances on difficult terrains. Show that D=100S for horizontal distance measurement using optical method **10 mks**

4a. You have carried out a direct measurement for horizontal distance determination from O.A.U campus to F.U.T.A North gate, describe the corrections required on the measurement for the determination of true horizontal distance. **8mks**

4b. A base line was measured with two Total station A and B under the same atmospheric conditions. Test the relative precision of the two instruments and determine the MPV of the length of the base line. **12 mks**

Total Station Instrument A	Total Station InstrumentB
55.023m	55.009m
55.021m	55.023m
55.022m	55.025m
55.024m	55.022m
55.009m	55.024m

5a. Write short note on the following:

i. Stadia method of tacheometry
ii. Tangential method of tacheometry **6mks**

5b. To determine the distance between points A and B, a tacheometer was set up at **P** and the following readings taken:

Staff at A: Staff reading = 2.228, 2.603, 2.982 and vertical angle given as $7^0\ 50^1$

Staff at B: Staff reading =1.620, 1.900, 2.000 and vertical angle as $-1^0 44^1$

The horizontal angle APB = $68^0\ 30^1\ 30^{11}$ and elevation at A = 310.400m. Determine the distance AB and the elevation of B **14 mks**

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
Rain Semester Examination 2018/2019 Session
SVG 204: Topographical Surveying

Answer any three questions. **Time Allowed: 2Hours**

1. a. What do you understand by topographical surveying? 10 Marks
   b. In clear terms, describe two data necessary for producing contour 10 Marks

2. Give a brief explanation of the following:
   i. Topography
   ii. Tower
   iii. Signal
   iv. Intersection
   v. Resection 20 Marks

3. a. Using illustrative sketch, discuss trigonometric heighting 10 Marks
   b. What is the objective of Topographical Surveying? 10 Marks

4. a. The terms "coordinates", "control" and "bench mark" are household words in Surveying. What do you understand by each of them? What is the relationship between them? 8 Marks
   b. A statement was once made by the Surveyor-General of the Federation that, "It is important for any topographical mapping project to be based on a well-established ground control" Discuss the truth or otherwise of this statement 6 Marks
   c. What principle is tacheometry based on and when is it needed 6 Marks

5. a. Discuss the relationship between Topographical Surveying and Photogrammetry 8 Marks
   b. Discuss the methods of representing relief 12 Marks

Esm/2018/074

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
RAIN SEMESTER EXAMINATION (RAIN SEMESTER 2019/2020 SESSION)

COURSE TITLE: Spherical and Field Astronomy; **COURSE CODE:** SVG 208
CLASS: 300 Level - Surveying and Geoinformatics
INSTRUCTIONS: Attempt any **3** questions. All questions carry equal marks.
TIME ALLOWED: **2** hours

POE
PED

Pof PDf

1. a. In a spherical triangle *ABC*, prove from the first principle that:

   Sina/SinA = sinb/SinB = Sinc/SinC.

   b. Solve completely the spherical triangle ABC, given that: $a = 47^\circ\ 48'$, $b = 39^\circ 51'$, $C = 68^\circ\ 37'$.

2. a. With the aid of sketch, distinguish between small circle and great circle. Give an example of each circle.

   b. List the 3 major uses of Field/Geodetic Astronomy.

   c. Draw a neat diagram of ***semi-celestial*** sphere and show the following: Celestial Horizon, Celestial equator, Hour circle, Vertical circle, Prime vertical, Zenith, North Pole, Almucantar circle, Observer's meridian and a heavenly body.

3. a. Highlight the composition of the Solar System

   b. What is the use of the ***Star Almanacs for Land Surveyors*** in Astronomical determinations?

   c. Name the 3 major co-ordinate systems of the Celestial Sphere. Why do we have the co-ordinate systems?

4. a. Name the three basic categories of instruments used for observations in Field/Geodetic Astronomy for the determination of Latitude, Longitude and Azimuth. Give 2 examples of each category.

   b. Identify the corrections that are applied to observed altitudes and directions in Astronomical measurements.

   c. Criticize the method of determining Astronomical azimuth from the Elongation observations.

5. a. Briefly describe any two methods you can adopt to set your telescope in the meridian.

   b. Mention 5 methods of determining Latitude by Astronomical method.

   c. A star was observed for latitude determination, and its corrected altitude was $40^\circ\ 36'\ 30''$. If the declination of the star was $10^\circ\ 36'\ 40''$ and the hour angle was $46^\circ\ 36'\ 20''$ determine the Latitude of the point of observation.

POF

PF = OPS

OBAFEMI AWOLOWO UNIVERSITY

FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT

DEPARTMENT OF ESTATE MANAGEMENT

SURVEYING AND GEOINFORMATICS PROGRAMME

2017/2018 HARMATTAN SEMESTER EXAMINATIONS

COURSE TITLE: SVG 201: Fundamental Surveying TIME ALLOWED: $2\frac{1}{2}$ Hours

INSTRUCTION: Answer **Question 1** and any other two

1 Compute the traverse of this survey lines carried out from survey station 1 to survey station 4. The traverse commenced on controls A and B and closed on controls C and D.

Station	Northings (m)	Eastings (m)
A	423842.443	168427.360
B	423645.732	167888.634
C	423091.614	168515.873
D	422883.945	168391.872

Station From	Bearing	Distance (m)	Station To	
B	84°36'07"	74.322	1	149° 39' 14"
1	67°13'25"	419.345	2	162° 33' 13"
2	171°23'53"	414.957	3	284° 10' 28"
3	178°49'46"	101.959	4	184° 25' 53"
4	154°12'01"	235.832	C	155
C	155°22'15"	(20 marks)		

2 (a) Describe extensively five methods of carrying out levelling operation (10 mks)

(b) Indicate the angular and linear errors of closure for the following categories of survey:

i First Order Traverse

ii Second Order Traverse and Accurate survey

iii Third Order traverse for boundary demarcation

iv Minor theodolite traverse for detailing

v Compass traverse (10 mks)

3 (a) The magnetic bearing of the sun at noon is 1788 30' from a station. Find the magnetic declination at that station. (5 mks)

Name: Jude Guidance Matric. No. ESM/2016/1066 (20)

Instruction: Answer all questions. Time Allowed: 20mins Total Mark: 10marks

Answer each question by shading the box with options A-D

1. What are the general principles of Surveying? (1) Working from whole to part (2) All survey methods must be checked. Provision of Adequate checks (3) locate new station by at least two measu

2. Convert the following Quadrantal Bearings (QBs) to Whole Circle Bearings (WCBs).
   QB of CD = N25° 35'E 25°35'
   QB of DE = N37° 13'W 323°47'

3. The basic requirement for any level equipment is to provide a horizontal line of sight.

4. In level focusing screw are used to bring the bubble to the center of its run or to centralize the circular bubble.

5. declination is angular difference between the magnetic bearing and the true bearing.

6. reduced surface is a relatively permanent object, natural or artificial, having a marked point whose elevation above or below a reference datum is known or assumed.

7. ~~Levelling~~ line of collimation is the line of sight defined by the optical centre of the object glass and the centre of the cross hairs.

8. Adjustments are of two types, What are they? Temporary And Permanent

9. Leveling up of the instrument, focusing of the telescope and the removal of parallax is known as Temporary Adjustment in levelling operation

10. The fore bearings of the lines AB, BC, CD and DE, are 45° 30', 120° 15', 200° 30' and 280° 45', respectively. Find angles B, C and A. (4 marks) - B = 105°15'00" C = 79°45'00" A =

11. Condition for determining the height of tower using measuring tape and ranging poles only is that the terrain must be fairly flat

12. Diaphragm is closely associated with
   (a) Trivet (b) Tripod (c) Telescope (d) Theodolite

13. The true meridian passes through
   (a) Geographical poles (b) Magnetic poles (c) Arbitrary poles (d) Greenwich meridian

14. Which of these is being used to measure a whole circle bearing
   (a) Surveyor's compass (b) Prismatic compass (c) both (d) none

15. The error introduced by magnetic material during compass traversing is called
   (a) Compass attraction (b) compass error (c) local attraction (d) local magnetism

16. Step chaining is a form ________ measurement
   (a) Direct (b) Indirect (c) Compound (d) simple

17. Essential difference(s) between a tie line and an offset is in
   (a) Mode and number of measurement (b) Number and period of measurement
   (c) Mode and period of measurement

18. Three categories of errors in chaining are:
   (a) Cumulative, systematic and gross (b) Compensating, systematic and gross
   (c) Random, compensating and gross (d) Accidental, random and cumulative

19. The horizontal angle between the true meridian and magnetic meridian is called
   (a) Local attraction (b) declination (c) magnetic dip (d) True North

20. In the WCB system, a line is said to be free from local attraction if the difference between the FB and BB is 180°

21. List three basic steps in temporary adjustment of a theodolite. (1) setting of theodolite on tripod stand (levelling of instrument) (2) Focusing (3) Removal of parallax

SVG 209 Type B

Matric Number: ESM/2016/086

1. Text placement. Place names, Rivers, Roads, and other labels associated with features on the map should VARY according to their importance and within their own hierarchy. TRUE/FALSE
2. When moving from the three-dimensional surface of the earth to a two-dimensional plane, distortions are evitable TRUE/ FALSE
3. Map projections introduce distortions in ...., ..., ..., and surface areas
4. The projection used for topographic maps ......UTM......
5. A coordinate system is defined by the ......Location...... of the origin, ...orientation...... of its axes, and the parameters
6. The origin of terrestrial systems can be specified as either ......Topocentric...... and ......geocentric......
7. In the Southern Hemisphere, the easting coordinate has an origin of ......0°...... at the central meridian
8. Distance on the map can be measured by .... and ....
9. There are three base lines namely ......Grid north...... ......Magnetic North...... and ......True North......
10. ......Azimuth...... is defined as a horizontal angle measured clockwise from a north base line
11. .... are a single realization of a spatial process
12. ......generalization...... Controls how many data can appear in a map frame, the size of symbols, the overlap of symbols, and much more
13. ......Title...... are used to identify the map and to inform the reader about its content
14. ......Topo maps...... shows detailed and accurate illustration of man-made and natural features on the ground
15. Geographic coordinates are expressed in ......Longitude and Latitude......
16. ......Legends...... lists the symbols used on a map and what they depict
17. On a legend, placement does not depend mostly on the shape of the mapped area. TRUE/ ~~FALSE~~
18. Legend should overwhelm the Map, but is high in the visual hierarchy. TRUE/ FALSE
19. Removing information related to base map features or a readily identifiable feature (highway symbols) is one not effective way to minimize legend size. TRUE/ FALSE
20. The Position of the title on the page will vary according the size and shape of the mapped area, but in every case should be the most prominent text and with the largest lettering. TRUE/ FALSE

(b) With the aid of a well labeled diagram of a prismatic compass, describe its various components and their functions. (15 mks)

4 (a) What is the minimum number of observations required for position determination in any given survey? Justify your assertion. (5 mks)

(b) The following successive readings were taken with a dumpy level at intervals of 30m:

2.925, 1.675, 2.010, 3.355, 3.725, 0.840, 1.245, -1.115, 2.630, 0.925, 1.775, 1.920, 2.125

1 2 3 4 5 6 7 8 9 10 11 12 13

The instrument was shifted after the fifth and ninth readings. The first reading was taken on Benchmark A of RL 209.51m. Find the RLs of all the points and apply arithmetic checks (15mks)

5 (a) Write short notes on the following

- (i) Quadrantal bearing
- (ii) True meridian
- (iii) Local attraction
- (iv) Level surface
- (v) Declination (15mks)

(b) Why do you level a theodolite? (5 mks)

OBAFEMI AWOLOWO UNIVERSITY
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
SVG 202 LARGE SCALE SURVEYING

RAIN SEMESTER EXAMINATION 2018/2019 ACADEMIC SESSION

ANSWER ANY THREE QUESTIONS TIME ALLOWED: 2 HOURS

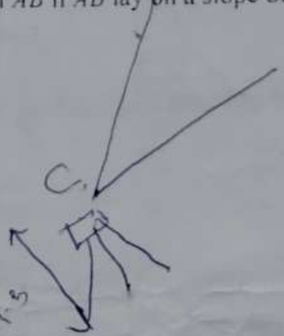
1a. The following are the observations made on the same angle:

47°26'13" 47°26'18" 47°26'10" 47°26'15" 47°26'16" 47°26'12" 47°26'09" 47°26'15" 47°26'18" 47°26'14"

Determine
(a) the most probable value of the angle,
(b) the range,
(c) the standard deviation,
(d) the standard error of the mean, and
(e) the 95% confidence limits. (15 marks)

1b. A line AB between the stations A and B was measured as 448.28 using a 20 m tape, too short by 0.08m. Determine the correct length of AB and the reduced horizontal length of AB if AB lay on a slope of 1 in 25. (5 marks)

2a. Define the following terms
i. Standard deviation
ii. Standard error
iii. Variance
iv. Standard error of mean
v. Most probable value
vi. Root mean square error
vii. Most probable error
viii. Degree of freedom
ix. Error
x. Mistakes



$V = \frac{1}{2} KS \sin 2\theta$
$D = KS \cos^2 \theta$

(5 marks)

2b. The following observation were made from instruments set up at point C to station A and B. The vertical angles for satiation A and B is given has -5^0 10' and $+27^0$ 30' respectively. While the stadia reading for station A is given as 1.386, 0.976 and 0.610 for upper middles and lower respectively. The stadia readings for station B is also taken to be 1.602, 1.286 and 0.995 for the upper, middle and lower respectively. If the height of the Tacheometer at point C is 1.55m above the ground with elevation of 75.50m, determine the horizontal distances CA and CB as well as the elevations of station A and B, also, determine the length of AB if the triangle formed is assumed to be a right angle triangle. (15 marks)

3b. Explain the principle of tachometry surveying (15 marks)
3b. Differentiate between the term accuracy and precision (5 marks)

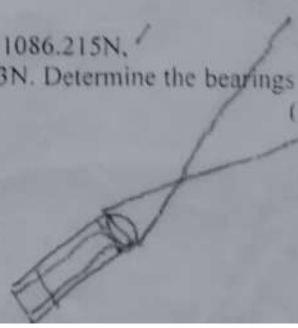
$\tan^{-1}$

4a In the case of inclined line of sight, the vertical angle α is measured, and the horizontal and vertical distances, D and V, respectively, show that $D = KS\cos^2\alpha$ and $V = 1/2KS\sin 2\alpha$ (15 marks)

4b You have carried out the survey of part of the Agric farm of the Obafemi Awolowo University using linear measurement only. State the various necessary corrections you would do in order to have a correct measurements of your observed distances. (5 marks)

5a Explain the fundamental principle of least squares adjustment (10 marks)

5b. The coordinates of three points A, B and C are given as point A 2614.168E and 1086.215N, Point B is 1932.782E and 1399.554N, while point C is 2174.368E and 1206.173N. Determine the bearings and distances AB, BC and AC (10 marks)



OBAFEMI AWOLOWO UNIVERSITY
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF ESTATE MANAGEMENT
(SURVEYING AND GEOINFORMATICS PROGRAMME)
SVG 101 (INTRODUCTION TO SURVEYING AND GEOINFORMATICS) EXAMINATION
HARMATTAN SEMESTER (2018/2019 Academic Session)

Answer any three (3) Questions   TIME ALLOWED: 2 *hours*

1 (a) Briefly explain the following
- i. Geodesy
- ii. Cadastral surveying
- iii. Hydrographic surveying
- iv. Photogrammetry
- v. Remote Sensing
- vi. Geographical Information Science **12 marks**

(b) Briefly discuss the importance of surveying and mapping to national development **5 marks**

(c) Differentiate the term accuracy and precision **3 marks**

2 (a) Explain the principle of "Working from whole to part" **10 marks**

(b) How does geodetic surveying differ from plane surveying? **10 marks**

3 (a) Discuss any 5 methods of surveying known to you **15 marks**

(b) List 5 applications of triangulation **5 marks**

4 (a) Explain the functions of SURCON **12 marks**

(b) Describe any eight (8) qualities you must possess as a Survey professional? **8 marks**

5 (a) Discuss in details, any four (4) of the essential considerations of the practise of surveying **16 marks**

(b) What is relative positioning? **4 marks**

GOOD LUCK

Cadas

Scientic Hone
Independence
Competency
Integrity
... Logic

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA
DEPARTMENT OF MATHEMATICS
Harmattan Mid-Semester Examination, 2019/2020 Academic Session
MTH 201 - Mathematical Methods I

Date: 8th April, 2021. **Time Allowed - One Hour**

Type 3

Instructions: Attempt all questions. Use HB pencil ONLY. Write and shade your **question type, Names, Registration Number** and the **correct option** in your OMR sheet.

1. Let the function $f : \mathbb{R}^2 \to \mathbb{R}$ be defined by
$$f(x,y) = \begin{cases} \frac{y^2-x^2}{xy-1} & \text{if } (x,y) \neq (1,1) \\ 2 & \text{if } (x,y) = (1,1) \end{cases}$$
Find $\frac{\partial f}{\partial y}$ at the point $(1,1)$.
(A) -1 (B) 1 (C) $\frac{1}{2}$ (D) 2

2. Let the function $z = g(x^2y)$, then
(A) $2x\frac{\partial z}{\partial x} = y\frac{\partial z}{\partial y}$ (B) $x\frac{\partial z}{\partial y} = y\frac{\partial z}{\partial x}$ (C) $x\frac{\partial z}{\partial x} = y\frac{\partial z}{\partial y}$ (D) $x\frac{\partial z}{\partial x} = 2y\frac{\partial z}{\partial y}$

3. Let $\{b_n\}$ be a convergent sequence such that $b_{n+1} = \sqrt{b_n + 1}$. Find $\lim_{n\to\infty} b_n$.
(A) $-\frac{1}{2} - \frac{\sqrt{5}}{2}$ (B) $\frac{1}{2} + \frac{\sqrt{5}}{2}$ (C) $-\frac{1}{2} + \frac{\sqrt{5}}{2}$ (D) $\frac{1}{2} - \frac{\sqrt{5}}{2}$

4. Let the function $g(x,y) = (x - y)\sin(3x + 2y)$. Find $\frac{\partial g}{\partial x}$ at the point $\left(0, \frac{\pi}{3}\right)$.
(A) $-\frac{\pi}{2} - \frac{\sqrt{3}}{2}$ (B) $\frac{\pi}{2} - \frac{\sqrt{3}}{2}$ (C) $-\frac{\pi}{2} + \frac{\sqrt{3}}{2}$ (D) $\frac{\pi}{2} + \frac{\sqrt{3}}{2}$

5. Find the $\lim_{x\to 0} x^2 \ln x$.
(A) 0 (B) ∞ (C) 2 (D) -2

6. Which of the following functions satisfies Euler's theorem on homogeneous functions?
(A) $\frac{x^3 - y^3}{x + y^3}$ (B) $\frac{x^3 - y}{x^2 + y^2}$ (C) $\frac{x^{\frac{1}{6}} + y^{\frac{1}{6}}}{x^{\frac{1}{3}} + y^{\frac{2}{3}}}$ (D) $\frac{x^{\frac{1}{6}} + y^{\frac{1}{6}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}}$

7. For what values of $x \in \mathbb{R}$ is the function $f(x) = \frac{x - |x|}{x}$ continuous?
(A) All x except 0 (B) All x (C) All $x \leq 0$ (D) All $x \geq 0$

8. Let the function $f : \mathbb{R} \to \mathbb{R}$ be defined by
$$f(x) = \begin{cases} 0 & \text{if } x \in \{\mathbb{R}\backslash\mathbb{Q}\} \\ \frac{1}{8} & \text{if } x \in \mathbb{Q} \end{cases}$$
where $\mathbb{Q}$ is a set of all rational numbers. Find all points at which f is discontinuous.
(A) At all points $\mathbb{R}\backslash\{0\}$
(B) At the entire $\mathbb{R}$
(C) At all points $\mathbb{R}\backslash\left\{\frac{1}{8}\right\}$
(D) At all points $\mathbb{R}\backslash\left\{0, \frac{1}{8}\right\}$

9. Which of the following series converges?
(A) $\sum_{n=1}^{\infty} \frac{n}{e^{n^2}}$ (B) $\sum_{n=1}^{\infty} \frac{1}{\sqrt[4]{n}}$ (C) $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$ (D) $\sum_{n=1}^{\infty} \frac{n}{n^2+1}$

$$\frac{(-1)^{n-1}\, n!}{x^n} \quad (-1)^{n-1}(n+3)!$$

10. Given that the nth derivative of $\log_e x$ is $D^n(\log_e x) = \dfrac{(-1)^{n-1}(n-1)!}{x^n}$, find the $(n+3)$th derivative of $\log_e x$.

(A) $\dfrac{(-1)^{n-1}(n+3)!}{x^{n+3}}$ (C) $\dfrac{(-1)^n(n+2)!}{x^{n+3}}$

(B) $\dfrac{(-1)^n(n+3)!}{x^{n+3}}$ (D) $\dfrac{(-1)^{n-1}(n+2)!}{x^{n+3}}$

11. If the function $F(x,t) = f(x-at)+g(x+at)$, where f and g are twice-differentiable functions, then $\dfrac{\partial^2 F}{\partial t^2}$ is the same as

(A) $a^3\dfrac{\partial^3 F}{\partial t^3}$ (C) $a^3\dfrac{\partial^2 F}{\partial t^2}$

(B) $a^2\dfrac{\partial^2 F}{\partial t^2}$ (D) $a^2\dfrac{\partial^3 F}{\partial t^3}$

12. Find the $\lim\limits_{t\to\infty}(\sqrt{t+1}-\sqrt{t})$.

(A) 1 (C) 0

(B) -1 (D) $\dfrac{1}{2}$

13. Find the interval of convergence of the series of real numbers

$$(x-1)+\frac{1}{2}(x-1)^2+\frac{1}{3}(x-1)^3+\cdots$$

(A) $0<x<2$ (C) $-2<x<1$

(B) $0<x<1$ (D) $-1<x<1$

14. Determine the nature of the stationary point of the function

$$f(x,y) = 4y-y^2+2x-x^2-3.$$

(A) Maximum (C) Minimum

(B) Sadle point (D) Inflexion

15. Which of these differentials is exact?

(A) $(y^2+6xy-x^2)dx+(2xy-3)dy$

(B) $\tan x\, dx+\sin x\cos y\, dy$

(C) $(2xy+e^y)dx+(x^2+xe^y)dy$

(D) $(x-y+2)dx+(3y+4x)dy$

16. Which of these is false about the sequence $\{(-1)^n\}$.

(A) $\{(-1)^n\}$ is not convergent.

(B) $\{(-1)^n\}$ has no limit.

(C) $\{(-1)^n\}$ is not bounded.

(D) $\{(-1)^n\}$ is not monotone.

17. Find the nth derivative of the function $y=\sin x$.

(A) $\sin\left(\dfrac{n\pi}{2}-x\right)$ (C) $\cos\left(\dfrac{n\pi}{2}+x\right)$

(B) $\cos\left(\dfrac{n\pi}{2}-x\right)$ (D) $\sin\left(\dfrac{n\pi}{2}+x\right)$

18. Which of these statements is true?

(A) A monotone sequence is bounded.

(B) A bounded sequence is monotone.

(C) A convergent sequence is bounded.

(D) A bounded sequence is convergent.

19. Suppose S_n is the nth partial sum of the convergent series $\sum a_n$, which of the following statements is true?

(A) $\lim\limits_{n\to\infty} a_n = \lim\limits_{n\to\infty} S_n$

(B) $\lim\limits_{n\to\infty} S_n = 0$

(C) $\lim\limits_{n\to\infty} a_n = S_n$

(D) $\lim\limits_{n\to\infty} S_n = \lim\limits_{n\to\infty} S_{n-1}$

20. Given the functions $u=x^2-y^2$, $v=xy$, find the Jacobian $J=\dfrac{\partial(u,v)}{\partial(x,y)}$, where $(x,y)\neq(0,0)$.

(A) x^2-y^2

(B) $2(x^2+y^2)$

(C) $2(x^2+y^2)$

(D) x^2+y^2

$\dfrac{\partial u}{\partial x} = 2x$ $\dfrac{\partial u}{\partial y} = 2y$ $\dfrac{\partial v}{\partial x} = y$ $\dfrac{\partial v}{\partial y} = x$

$$\sqrt{t+1}-\sqrt{t} \times \frac{\sqrt{t+1}+\sqrt{t}}{\sqrt{t+1}+\sqrt{t}}$$

$$\frac{(t+1)-t}{\sqrt{t+1}+\sqrt{t}} = \frac{1}{\infty} = 0$$

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA.
DEPARTMENT OF MATHEMATICS.
RAIN MID-SEMESTER EXAMINATION. 2018/2019 SESSION
STT 202 - PROBABILITY DISTRIBUTIONS I - 3 Units
OCTOBER, 2019.

Time Allowed: 40 minutes

Instructions: Write your **NAMES** in full, your **REGISTRATION NUMBER** and your **DEPARTMENT**. **Attempt all questions.**

1 (a) A bag contains 8 red, 3 white and 9 blue balls. 3 balls are selected at random from the bag. Find the probability that they are all red if the balls are selected

(i) with replacement;

(ii) without replacement.

(b) (i) State the Bayes' theorem.

(ii) Suppose a student is taking a multiple-choice test. On a given question, he either knows the answer, in which case, he answers it correctly, or he does not know the answer, in which case he guesses hoping to get the right answer. Denote p the probability that he knows the answer and $1-p$ the probability that he guesses. Assume that the probability that a student gets the right answer given that he guesses is $\frac{1}{m}$ (where m represents the number of multiple-choice alternatives), find the conditional probability that a student knew the answer to the question that he answered correctly.

2 (a) Given that the rth moment of a random variable X, $E[X^r] = r!2^r$, find the moment generating function of X.

(b) Suppose a random variable X has binomial distribution with parameters n and p. If $E[X] = 5$ and $Var[X] = 4$, find the values of n and p.

(1-p)

19/285

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA.
DEPARTMENT OF MATHEMATICS.
B. Sc. (Statistics) Degree Examination.
Rain Semester, 2018/2019 Session.
STT 202 - Probability Distributions I - 3 Units
December, 2019.

Time Allowed: **2** *hours*

Instructions: Write your names in **FULL**, and your **REGISTRATION NUMBER**.
All undefined symbols have their usual meanings.
Attempt **ANY FOUR** questions **ONLY**.

1. (a) The probability density function of age (in years) of babies brought to a post-natal clinic is given by

$$f(x) = \begin{cases} \frac{3}{4}x(2-x), & 0 < x < 2, \\ 0, & \text{Otherwise;} \end{cases}$$

where the random variable X represents age.

(i) If 60 babies are brought in on a particular day, how many are expected to be under 8 months old?

(ii) Find the mean age of babies brought to the clinic.

(iii) Obtain the variance of the distribution of the babies brought to the clinic.

(b) (i) State the Chebyshev's inequality.

(ii) For the random variable X in 1(a), use the Chebyshev's inequality to obtain an upper bound on $P(|X-\mu| \geq 1)$, where μ is the mean of X.

(20 marks)

2. (a) If one out of every five children in a family is a sickle cell patient, find the probability that out of 500 such children,

(i) no fewer than 120 are sickle cell patients; and

(ii) between 80 and 110 children are sickle cell patients.

(b) Let X and Y be random variables with joint probability density function

$$f(x,y) = \begin{cases} x+y, & 0 < x < 1, 0 < y < 1, \\ 0, & \text{Otherwise;} \end{cases}$$

(i) Obtain the marginal distributions of X and Y.

(ii) Hence, based upon Question 2(b)(i) above, determine whether or not X and Y are independent.

(20 marks)

3. (a) State **4** axioms of probability.

(b) A bag contains 6 red, 5 white and 12 blue balls. 4 balls are selected at random from the bag. Find the probability that they are all white if the balls are selected

(i) with replacement;

(ii) without replacement.

(c) (i) State the Bayes' theorem;

(ii) Suppose a student is taking a multiple-choice test. On a given question, he either knows the answer, in which case, he answers it correctly, or he does not know the answer, in which case he guesses hoping to get the right answer. Denote p the probability that he knows the answer and $1-p$ the probability that he guesses. Assume that the probability that a student gets the right answer given that he guesses is $\frac{1}{m}$ (where m represents the number of multiple-choice alternatives), find the conditional probability that a student knew the answer to the question that he answered correctly.

(d) Dayo can either take a course in Computer or Mathematics. If he takes a computer course, he will receive an A grade with probability $\frac{1}{2}$; if he takes a course in Mathematics, he will receive an A grade with probability $\frac{1}{3}$. Dayo decides to take his decision on a flipped of a fair coin

(i) What is the probability that he will get an A in Mathematics? 2/5

(ii) What is the probability that he will not get an A in Computer? 3/5

(20 marks)

4. (a) (i) Show that if X follows a binomial distribution, the probability generating function of X,

$$G(t) = (1 + p(t-1))^n,$$

t^n

where p is the parameter of the binomial distribution and n is the sample size.

(ii) Hence, based upon Question 4(a)(i) above, obtain the mean and variance of the binomial distribution.

(b) After a seed marketing company had embarked on a rigorous advertisement of their produce, it was estimated that their potentials for any contact resulting in a successful marketing of their produce had risen to 15%. Find the probability that if 7 such contacts were made thereafter,

(i) this will result in more than one sale;

(ii) the fifth contact will result in their third sales.

(20 marks)

5. (a) Given that the r^{th} moment of a random variable X, $E[X^r] = r!2^r$, find the moment generating function of X.

(b) Suppose a random variable $X \sim \text{Normal}(\mu, \sigma^2)$, obtain the following

(i) the moment generating function of X;

(ii) the mean of X; and
(iii) the variance of X.

(20 marks)

6. (a) When does a variable X follow a hypergeometric distribution?

(b) (i) Show that if X follows a hypergeometric distribution, then

$$\sum_{x=0}^{n} xP(X=x) = \frac{nM}{N};$$

where N is the population consisting of M successes and n is the sample size.

(ii) When does the mean of the hypergeometric distribution and that of the binomial distribution coincide?

(c) Based upon Question 6(b)(i), verify that the variance of X, $Var(X)$ is

$$Var(X) = \frac{nM}{N}\left(\frac{N-M}{N}\right)\left(\frac{N-n}{N-1}\right).$$

(d) Assume a fatal auto accident on the highways of United States occur with rate 2 per hour. What is the probability that no fewer than 2 fatal accidents occur in a 24-hour period?

(20 marks)

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
2ND SEMESTER EXAMINATION (RAIN SEMESTER 2018/2019 SESSION)

COURSE TITLE: Spherical and Field Astronomy; **COURSE CODE**: SVG 208
CLASS: 200 Level- Surveying and Geoinformatics
INSTRUCTIONS: Attempt any **3** questions. All questions carry equal marks.
TIME ALLOWED: 2 hours

1. a. In a spherical triangle ABC, prove from the first principle that:

$$\mathrm{Cos}a = \mathrm{Cos}b\ \mathrm{Cos}c + \mathrm{Sin}b\ \mathrm{Sin}c\ \mathrm{Cos}A.$$

b. Two radio observatories wish to set up radio link. Their longitude and latitude are respectively 12° 18' 24"E, 53° 14' 12"N and 89° 50' 12"E, 38° 26' 18"N. In what angular direction to the North must the antenna at the second station be set to achieve the best transmission?

2. a With the aid of sketch, distinguish between small circle and great circle. Give an example of each circle.

b. List the 3 major uses of Geodetic Astronomy.

c. Draw a neat diagram of ***semi-celestial*** **sphere** and show the following: Celestial Horizon, Celestial equator, Hour circle, Vertical circle, Prime vertical, Zenith, North Pole, Almucantar circle, Observer's meridian and a heavenly body.

3. a. Outline the need for Astronomical Azimuth determination.

b. In an Astronomical Triangle ZPS, identify the six parameters of the triangle.

c. Derive an expression for the computation of the Astronomical angle of a body given the quantities in 3b above.

4. a. What do you understand by elongation of a star?

b. State the conditions for the elongation of a star

c. A star of declination 60° 52' 34" N and Right ascension $11^h\ 02^m\ 21^s$ was observed at a station (07° 50' 30" N, 03° 37' 00" E) at elongation.

Calculate: (i) the altitude of elongation of the star
(ii) the azimuth of the East and West elongation
(iii) the hour angle of East and west elongation

5. a. Mention 5 methods of determining Latitude by astronomical method.

b. A star was observed for latitude determination, and its corrected altitude was 32° 20' 41''. The declination of the star was 8° 12' 12''S and the hour angle was 3hours 43minutes 43seconds. Determine the latitude of the point of observation.

Esm/2018/074.
Oyetunde Adeola

OBAFEMI AWOLOWO UNIVERSITY
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
SVG 209 (FUNDAMENTAL CARTOGRAPHY) EXAMINATION
HARMATTAN SEMESTER (2019/2020 Academic Session)

ANSWER ANYTHREE (3) QUESTIONS TIME ALLOWED: *2 hours*

1 (a) Discuss cartography as science, art and technology. (10 marks)

(b) Discuss the fundamental problems of a cartographer. (10 marks)

2 (a) Describe the UTM measurements and coordinates for position determination with respect to Northing and Easting components (16 marks)

(b) What is a coordinate system? (4 marks)

3 (a) The following perpendicular offsets were measured at 15m intervals from a chain line to an irregular boundary line 3.50,4.30,6.75,5.25,7.50,8.80,7.90,6.40,4.40,3.25m.
Calculate the area enclosed between the chain line and the irregular boundary using
(1) Trapezoidal rule and
(2) Simpson's rule (10 marks)

(b) You have been approached by your community to assist them in producing the topographic map, describe any five methods you can adopt to depict the relief. (10 marks)

4 (a) Briefly describe the following

a. Depression
b. Ridge
c. Valley
d. Saddle
e. Hill (10 marks)

(b) Determine the area enclosed in the measurement below using coordinate method (5 marks)

Points	Northing (m)	Easting (m)
A	773707.456	444772.786
B	773685.430	472886.631
C	801342.784	444802.699
D	801319.987	472490.856

(c) Why is the UTM system not applicable between latitudes eighty four degrees north (84^0N) to eighty degrees south (80^0S). (5 marks)

5. Maps vary according to their purpose. Whereas, all the different kinds of maps can be put into two bro[ad] categories based on the purpose. Describe the two traditional types of map and data categories. (20 marks)

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA
DEPARTMENT OF MATHEMATICS
Rain Semester Examination, 2019/2020 Academic Session
MTH 202 - Mathematical Methods II

Date: 24th September, 2021. **Type 3** **Time Allowed - Two Hours**

Instructions: Attempt all questions. Use HB pencil ONLY. Write and shade your **question type, Name, Registration Number** and the **correct options** on your OMR sheet. All undefined symbols imply their usual meanings.

1. The locus of the expression $Re\left(\frac{1}{z}\right) = \frac{1}{8}$ describes
   (A) A circle of centre $(4,0)$ radius 2 units
   (B) A circle of centre $(2,0)$ radius 4 units
   (C) A circle of centre $(2,0)$ radius 2 units
   (D) A circle of centre $(4,0)$ radius 4 units

$z = x+iy$, $\frac{1}{z} = \frac{1}{x+iy} = \frac{1}{8}$

$\frac{1}{x+iy} \times \frac{x-iy}{x-iy}$

$= \frac{x-iy}{x^2+y^2} = \frac{1}{8}$

$\frac{x}{x^2+y^2} = \frac{1}{8}$

$8x = x^2+y^2$

$x^2+y^2-8x=0$

$x^2-8x=0$

$(x-4)^2 -$

2. The canonical form of the quadratic form $Q = x_1^2 + 24x_1x_2 - 6x_2^2$ is
   (A) $Q = 10y_1^2 - 15y_2^2$
   (B) $Q = 10y_1^2 + 15y_2^2$
   (C) $Q = 10y_1^2 + 5y_2^2$
   (D) $Q = 10y_1^2 - 5y_2^2$

3. The Kernel of the linear map $T : \mathbb{R}^3 \to \mathbb{R}^2$ defined by $T(x,y,z) = (x,x)$ is
   (A) $\langle(0,1,0),(0,0,1)\rangle$ (C) $\langle(0,1,0)\rangle$
   (B) $\langle(0,0,1)\rangle$ (D) $\langle(1,0,1)\rangle$

4. Given that $\mathbf{A}$ and $\mathbf{B}$ are invertible $n \times n$ matrices and $\mathbf{I}$ is $n \times n$ unit matrix. Which of the following is not true ?
   (A) $(\mathbf{AB})^{-1}\mathbf{BAB} = \mathbf{B}$
   (B) $\mathbf{AB}(\mathbf{AB})^{-1}\mathbf{B} = \mathbf{B}$
   (C) $(\mathbf{AB})^{-1}\mathbf{AB} = \mathbf{I}$
   (D) $(\mathbf{AB})^{-1}\mathbf{A} = \mathbf{B}^{-1}$

5. Consider the set $S = \{(1,0,-1),(1,2,1),(0,-3,2)\}$. Which of the following is/are true about S?
   i. S is linearly dependent.
   ii. S spans $\mathbb{R}^3$.
   iii. S is a basis of $\mathbb{R}^3$.

   (A) i and iii (C) i only
   (B) i and ii (D) ii and iii

6. Suppose a, b and c are nonzero real numbers, then the eigenvalues of $\mathbf{A} = \begin{pmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{pmatrix}$ are
   (A) $a+bi$ and $a-bi$
   (B) a and b
   (C) 0 or purely imaginary
   (D) a and c

7. The Kernel of the map $T : \mathbb{R}^2 \to \mathbb{R}^2$ defined by $T(x,y) = (x,0)$ is
   (A) $\{(0,y) \in \mathbb{R}^2 \,|\, y \in \mathbb{R}\}$
   (B) $\{(0,0)\}$
   (C) $\{(x,0) \in \mathbb{R}^2 \,|\, y \in \mathbb{R}\}$
   (D) $\{(0,1)\}$

8. If $(1+i)(1+2i)(1+3i)\ldots\ldots(1+ni) = a+ib$, then what is $2 \times 5 \times 10 \ldots.(1+n^2)$ is equal to?
   (A) $2a+3b$ (C) $2a-3b$
   (B) a^2+b^2 (D) a^2-b^2

pe 3

9. Let $f(x,y) = x^3y$. Calculate the directional derivative of f in the direction of $\mathbf{i}+3\mathbf{j}$ at the point (2,3).

(A) $6\sqrt{10}$ (C) $3\sqrt{10}$

(B) $10\sqrt{6}$ (D) $10\sqrt{3}$

10. A subspace W of $\mathbb{R}^4$ is generated by the set $S = \{(1,-2,5,-3),(2,3,1,-4),(3,8,-3,-5)\}$. The dimension of W is

(A) 1 (C) 3

(B) 0 (D) 2

11. Which of the following sets is an eigenbasis of matrix $\mathbf{A} = \begin{pmatrix} 6 & -3 \\ 4 & -1 \end{pmatrix}$ for $\mathbb{R}^2$?

(A) $\left\{\begin{pmatrix} 3 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 4 \end{pmatrix}\right\}$ (C) $\left\{\begin{pmatrix} 3 \\ 3 \end{pmatrix}, \begin{pmatrix} 1 \\ 4 \end{pmatrix}\right\}$

(B) $\left\{\begin{pmatrix} 3 \\ 4 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \end{pmatrix}\right\}$ (D) $\left\{\begin{pmatrix} 1 \\ 3 \end{pmatrix}, \begin{pmatrix} 4 \\ 1 \end{pmatrix}\right\}$

12. Which of the following is/are not necessarily true of a vector space?

i. A vector space cannot have more than one basis.

ii. If a vector space has finite basis, then the number of elements in every basis is the same.

iii. Every vector space has a finite basis.

(A) i and ii (C) i and iii

(B) ii only (D) ii and iii

13. Which of the following matrices is not orthogonal?

(A) $\begin{pmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & -1 \end{pmatrix}$

(B) $\begin{pmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{pmatrix}$

(C) $\begin{pmatrix} \cos\theta & \sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{pmatrix}$

(D) $\begin{pmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{pmatrix}$

14. The curl of vector function $\mathbf{A} = z\hat{e}_\vartheta$ in the cylindrical polar coordinate system (ρ,ϑ,z) is

(A) $-\hat{e}_\rho + \frac{z}{\rho}\hat{e}_z$ (C) $-\rho\hat{e}_\rho + \frac{z}{\rho}\hat{e}_z$

(B) $z\hat{e}_\rho - \frac{1}{\rho}\hat{e}_z$ (D) $\rho\hat{e}_\rho + \frac{z}{\rho^2}\hat{e}_z$

15. Find the value of p for which the vector function $\mathbf{A} = 3y^4z^2\mathbf{i} + 4x^2y^3\mathbf{j} + px^2y^2z\mathbf{k}$ is solenoidal $(x \neq y \neq 0)$.

(A) 12 (C) -12

(B) 2 (D) -2

16. On the Argand diagram, the square roots of i lie in the

(A) 2^{nd} and 4^{th} quadrants

(B) 1^{st} and 2^{nd} quadrants

(C) 1^{st} and 4^{th} quadrants

(D) 1^{st} and 3^{rd} quadrants

17. The value of x for which $v = (1,x,5)$ is a linear combination of $(1,-3,2)$ and $(2,-1,1)$ is

(A) -8 (C) -6

(B) 8 (D) 6

18. What is the rank of the matrix $\mathbf{A} = (a_{ij})$ whose entries a_{ij} satisfy

$$a_{ij} = 2^{i+j-2}, \quad i,j = 1,2?$$

(A) 0 (C) does not exist

(B) 2 (D) 1

19. Which of the following is true of a linear map $T: V \to W$?

(A) $\operatorname{rank}(T) + \operatorname{nullity}(T) = \dim V$

(B) $\operatorname{rank}(T) - \operatorname{nullity}(T) = \dim W$

(C) $\operatorname{rank}(T) + \operatorname{nullity}(T) = \dim W$

(D) $\operatorname{rank}(T) - \operatorname{nullity}(T) = \dim V$

20. Let $T:\mathbb{R}^2\to\mathbb{R}^2$, which of the following is linear ?

(A) $T(x,y)=(x^2,x+y)$

(B) $T(x,y)=(0,y)$

(C) $T(x,y)=(x,xy)$

(D) $T(x,y)=(yx,y)$

21. Which of the following is/are true of a linear map T? (i)T preserves addition
(ii) T preserves scalar multiplication
(iii) $T(0)=0$

(A) (ii) only

(B) (i), (ii) and (iii)

(C) (iii) only

(D) (i) only

22. Evaluate the determinant of **AB** given that

$$\mathbf{A}=\begin{pmatrix}1&a&b&c\\0&a&c&b\\0&0&-b&a\\0&0&0&c\end{pmatrix}\text{ and}$$

$$\mathbf{B}=\begin{pmatrix}a&0&0&0\\b&c&0&0\\0&c&0&0\\a&b&c&b\end{pmatrix}.$$

(A) $-a^2b^2c^2$

(B) 0

(C) $a-b+c$

(D) $-abc$

23. The system of linear equations

$$x_1-x_2+2x_3=1,\ 2x_1+2x_3=1,\ x_1-3x_2+4x_3=2$$

has

(A) finite solutions.

(B) unique solution.

(C) no solution.

(D) infinitely many solutions.

24. Which of the following statements is not true concerning the determinant of a square matrix **A**?

(A) Multiplication of all entries of **A** by a scalar α will imply determinant of **A** is multiplied by α

(B) Transposition of **A** leaves the value of determinant unaltered

(C) Proportional rows in **A** render the value of determinant of **A** zero

(D) Interchange of two rows of **A** gives the determinant of **A** multiplied by -1

25. The Euler's representation for the complex number $z=i^i$ is

(A) $z=e^{(\frac{\pi}{2}+2k\pi)},\ k\in\mathbb{Z}$

(B) $z=e^{-i(-\frac{\pi}{2}+2k\pi)},\ k\in\mathbb{Z}$

(C) $z=e^{-(\frac{\pi}{2}+2k\pi)},\ k\in\mathbb{Z}$

(D) $z=e^{-i(\frac{\pi}{2}+2k\pi)},\ k\in\mathbb{Z}$

26. Simplify the complex number $z=(1-i)^{12}$.

(A) 32

(B) -32

(C) -64

(D) 64

27. The image of linear map $T:\mathbb{R}^3\to\mathbb{R}^2$ defined by $T(x,y,z)=(x,x)$ is

(A) $\langle(0,0)\rangle$

(B) $\langle(1,1)\rangle$

(C) $\langle(1,0)\rangle$

(D) $\langle(0,1)\rangle$

28. Which of the following is/are subspaces of $\mathbb{R}^3$?

(A) $W=\{(x,y,z):x+y+z=0,\ x-y+z=1\}$.

(B) $W=\{(x,y,z):x=-z,\ x=y\}$.

(C) $W=\{(x,y,z):x+2y-3z=4\}$.

(D) $W=\{(x,y,z):x^2+y^2=z\}$.

29. If the rank of the linear map $T:\mathbb{R}^3\to\mathbb{R}^3$ is 2, then the nullity of T is

(A) 0

(B) 3

(C) 1

(D) 2

$r^n(\cos n\theta + i\sin n\theta)$

$(\sqrt{2})^n(\cos 12\times\pi + i$

30. Which of the following is an eigenvector of the matrix $\mathbf{A} = \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$?

(A) $(-3,1)$ (C) $(0,-3)$

(B) $(1,-3)$ (D) $(-3,0)$

31. If $x \neq a \neq b$, solve for x in the equation $\begin{vmatrix} x & a & b \\ x^2 & a^2 & b^2 \\ a+b & x+b & x+a \end{vmatrix} = 0.$

(A) $-a+b$ (C) $a+b$

(B) $a-b$ (D) $-a-b$

32. Find the unit normal to the surface $\sqrt{x^2+y^2+z^2} = 5$ at point (0,1,2)

(A) $\frac{1}{\sqrt{5}}(0,1,2)$ (C) $\frac{1}{\sqrt{5}}(1,1,-1)$

(B) $\frac{1}{\sqrt{5}}(1,1,1)$ (D) $\frac{1}{\sqrt{5}}(1,-1,1)$

33. If the inverse of an $n \times n$ matrix $\mathbf{A}$ exists. Which of the following is not true?

(A) Nullity of **A** is zero

(B) Rank($\mathbf{A}$) $= n$

(C) **A** is singular

(D) **A** is invertible

34. Let **A** be an $n \times n$ matrix and Rank($\mathbf{A}$) $= r < n$. Which of the following statements is true?

(A) **A** is invertible

(B) determinant of **A** is zero

(C) **A** is nonsingular

(D) Nullity of **A** is zero

35. By using the eigenbasis of $\mathbf{A} = \begin{pmatrix} 5 & 3 \\ 3 & 5 \end{pmatrix}$ for $\mathbb{R}^2$, diagonalize **A**.

(A) $\begin{pmatrix} 1 & 0 \\ 0 & 7 \end{pmatrix}$ (C) $\begin{pmatrix} 4 & 0 \\ 0 & 10 \end{pmatrix}$

(B) $\begin{pmatrix} 2 & 0 \\ 0 & 8 \end{pmatrix}$ (D) $\begin{pmatrix} 3 & 0 \\ 0 & 9 \end{pmatrix}$

$(5-\lambda)(5-\lambda) - 9$

36. One of the following is not a basis of $\mathbb{R}^3$ containing $S = \{(1,0,2),(1,1,4)\}$.

(A) $\{(1,0,2),(1,1,4),(0,1,3)\}$.

(B) $\{(1,0,2),(1,1,4),(2,1,6)\}$.

(C) $\{(1,0,2),(1,1,4),(3,1,3)\}$.

(D) $\{(1,0,2),(1,1,4),(1,1,3)\}$.

37. Given the lower triangular matrix

$$\mathbf{B} = \begin{pmatrix} a & 0 & 0 & 0 \\ 1 & 1/a & 0 & 0 \\ 1 & 1 & 1/b & 0 \\ 1 & 1 & 1 & c \end{pmatrix}, \qquad a,b,c \neq 0.$$

Evaluate the determinant of $\mathbf{B}^{-1}$.

(A) b/c (C) 1

(B) c/b (D) 0

38. Evaluate the nullity of the matrix $\mathbf{A} = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 2 & 4 & 6 \end{pmatrix}$.

(A) 3 (C) 1

(B) 2 (D) 0

39. Let the function f in the cylindrical polar coordinate system (ρ, ϑ, z) be defined by $f(\rho,\vartheta,z) = \rho^2\vartheta^2 z^2$. Find the Hamiltonian, ∇f.

(A) $2\rho\vartheta z\,\hat{e}_\rho + z^2\,\hat{e}_\vartheta + \rho\vartheta\,\hat{e}_z$

(B) $2\rho\vartheta^2 z^2\,\hat{e}_\rho + 2\rho\vartheta z^2\,\hat{e}_\vartheta + 2\rho^2\vartheta^2 z\,\hat{e}_z$

(C) $\vartheta z^2\,\hat{e}_\rho + 2z\,\hat{e}_\vartheta + \rho\vartheta^3\,\hat{e}_z$

(D) $\vartheta^2 z\,\hat{e}_\rho + z\rho\,\hat{e}_\vartheta + 2\rho\vartheta^3\,\hat{e}_z$

40. Find all $(x_1,x_2,x_3) \in \mathbb{R}^3$ satisfying

$$x_1+x_2+2x_3 = 1,\; x_2+2x_3 = 2,\; x_1+2x_2+4x_3 = 3.$$

(A) $\{(-1, 2-2k, k),\, k \in \mathbb{R}\}$

(B) $\{(-1,-2-2k,1+k),\, k \in \mathbb{R}\}$

(C) $\{(k, 2k-2, 1),\, k \in \mathbb{R}\}$

(D) $\{(-k,-2k+2,k-1),\, k \in \mathbb{R}\}$

$x_2 = 2(1-x_3)$

$x_1 + 2 - 2x_3 + 2x_3 = 1$

$x = -1$

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA
DEPARTMENT OF MATHEMATICS
RAIN SEMESTER EXAMINATION, 2019/2020 SESSION
STT 202-PROBABILITY DISTRIBUTIONS I

Time Allowed: 2 hours;30 Mins

Date: 27th September,2021

Instructions: Answer any four (4) questions. Write your name and registration number and department boldly.

(1a) Define the following concepts of probability:
  (i) Mutually Exclusive Events
  (ii) Dependent Events
  (iii) Independent Events

$P(A \cap B) = P(A) \cdot P(B)$.
$P(A|B) = \frac{P(B \cap A)}{P(B)}$.

(1b) (i) State without prove Bayes' theorem
  (ii) Consider 2 urns, the first containing 2 white and 7 black balls and the second containing 5 white and 6 black balls. We flip a fair coin and draw a ball from the first urn or second urn depending on whether the outcome was Head or Tail. What is the probability that the outcome of the toss was Heads given that a white ball was selected.

(1c) Consider the experiment of tossing two dice. Let A denotes the event of an odd total, B the event of an Ace on the first die and c the event of a total of seven.
  (i) Prove if A and B are independent
  (ii) Show if A and C are independent
  (iii) Show if B and C are independent

$P(W) = \frac{2}{9}$
first urn.
$P(W) =$

(2a) (i) State the axioms of probability
  (ii) For what value of c is the function

$$P(X = x) = c\left(\frac{1}{4}\right)^x, x = 1, 2, 3, \ldots$$

serves as probability density function of a random variable X

H (2W 7B)
T (5W & 6B)

$P(OA \cap S)$
$P\,OA$

(2b) (i) A fair die is tossed twice. Find the probability of getting a 2,4 or 6 on the first toss and 3, 4 or 5 on the second toss.
  (ii) Describe the two events?

(2c) The intramuscular (IM) versus Oral Administration (OA) of antibiotics to students from faculty of science and those from faculty of Social and Management Sciences (SMS) who attended the health center in January 2021 gave the following result.

Antibiotics Faculty	Science	SMS
IM	30	16
OA	26	40

Determine the probability that:
  (i) A science student who received an oral administration was selected;
  (ii) A science student or a student who received an oral administration was selected; and
  (iii) Student who received an oral administration was selected.

$\frac{66}{112}$
$\frac{26}{112} \times \frac{112}{66}$

(3a) A random variable X has a mean $\mu = 10$ and variance $\sigma^2 = 4$. Using Chebychev's theorem, find:
  (i) $P(|X - 10| \geq 3)$; and
  (ii) $P(5 < X < 15)$.

$P(A \cap B) = \frac{P(A)\ P(B)}{P(B)}$
$P(B|A) = \frac{P(A \cap B)}{P(A)}$.

(3b) Suppose a random variable Y with probability of success p in n trials follows a binomial distribution. Obtain about the origin the

(i) Moment generating function; hence

(ii) the mean and the variance.

(4a) State the properties that identify Poisson experiment , $P(\lambda)$.

(4b) Suppose $W \sim B(n, p)$, where $B(n, p)$ is a binomial distribution with probability of success p in n trials for each value, $x = 0, 1, 2, \ldots$, and as $p \to 0$ with $np = \mu$ constant. Prove that

$$\lim_{n\to\infty} \binom{n}{x} p^x (1-p)^{n-x} = \frac{e^{-\mu}\mu^x}{x!}$$

(5). a. Let Y be a continuous random variable with probability density function (pdf)

$$f_Y(y) = 3y^2 \quad , \quad 0 < y < 1$$

and

$$f_Y(y) = 0; \quad \text{otherwise.}$$

(i.) Find the cumulative distribution function (cdf denoted by $F_U(u)$) of $U = 2Y + 3$ for $3 < u < 5$.

(ii.) Find the pdf for 5a(i).

b. Let X and Y be two continuous random variables with joint pdf

$$f_{X,Y}(x, y) = cx^2y(1+y) \quad \text{for} \quad 0 \le x \le 3;\ 0 \le y \le 3$$

and

$$f_{X,Y}(x, y) = 0; \quad \text{otherwise.}$$

(i.) Find the value c.

(ii.) Find the marginal pdf of X, denoted by $f_X(x)$ directly from $f_{X,Y}(x, y)$.

(iii.) Find the joint cdf of X and Y, denoted by $F_{X,Y}(x, y)$ of $f_{X,Y}(x, y)$.

(iv.) Find the marginal cdf of X, denoted by $F_X(x)$ of 5b(iii),.

(v.) Show that 5b(ii) is the derivative of 5b(iv).

(vi.) Are X and Y independent?

6.(a) Define a moment generating function of a random variable X having a pdf $f(x)$

(b) Suppose that X has continuous random variable with probability density function:

$$f_X(x) = \lambda e^{-\lambda x}; \qquad 0 < x < +\infty.$$

Show that the moment generating function (mgf) of the continuous random variable X, is

$$M_X(t) = \frac{\lambda}{\lambda - t}.$$

(c) Find the mean and variance of the continuous random variable X.

(d) Comment about the $M_X(t)$ of $6.(b)$.

(e) Suppose that the continuous random variable Y has the following mgf:

$$M_Y(t) = \frac{e^t}{4 - 3e^t}; \quad t < -\log(0.75).$$

Find,

(i.) The expectation of Y, denoted by $E[Y]$ and

(i.) The expectation of Y^2, denoted by $E[Y^2]$.

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA

DEPARTMENT OF MATHEMATICS

Rain Mid-Semester Examination, 2019/2020 Session

25th August, 2019.

STT 202-Probability Distributions I

Time: 1 hour

TYPE II

INSTRUCTIONS: Attempt all questions. All undefined symbols have their usual meanings. Write your **Names, Registration Number** and **Question Type** boldly on your **Answer sheet.** Use **HB** pencil only.

1. For what value of C is the function $f(x) = c\left(\frac{1}{4}\right)^x, (x = 1, 2, 3, \cdots)$ serves as probability density function of a random variable X.

   (a). 1, (b). 3, (c). 5, (d). $\frac{12}{52}$

   $\int_0^\infty \left(\frac{1}{4}\right)^x \quad \frac{1}{4} + \left(\frac{1}{4}\right)^2 + \left(\frac{1}{4}\right)^3 +$

2. The intramuscular (IM) versus Oral Administration (OA) of antibiotics to students from faculty of science and those from faculty of Social and Management Sciences (SMS) who attended the health center in January 2021 gave the following result.

Antibiotics\Faculty	Science	SMS
IM	30	16
OA	26	40

   Determine the probability if a science student or a student who received an oral administration is selected.

   (a). $\frac{33}{56}$, (b). $\frac{56}{112}$, (c). $\frac{96}{112}$, (d). $\frac{1}{2}$

3. Four cards are drawn from a standard pack of cards, what is the probability that two or fewer are Space?

   (a) $\frac{11}{13}$, (b). $\frac{11}{4165}$, (c). $\frac{5}{112}$, (d). $\frac{19912}{20825}$

4. Suppose A and B are two independent events with probabilities 0.45 and 0.30 respectively. Find P(A|B)

   (a). 0.45, (b). 0.30, (c). 0.135, (d). 0.75

5. Suppose a coin is loaded such that a Head is likely to appear thrice more than a tail, what is the probability of a tail?

   $1 \Rightarrow T + 3T$ (a). $\frac{3}{4}$, (b). $\frac{3}{8}$, (c). $\frac{1}{4}$, (d). $\frac{1}{8}$

   $\frac{13}{52} \times \frac{12}{51} \times \frac{39}{50} \times \frac{38}{49} +$

   $\frac{13}{52} \times \frac{39}{51} \times \frac{38}{50} \times \frac{37}{49}$

   $\frac{39}{52} + \frac{38}{51} + \frac{37}{50} + \frac{36}{49}$

Use the following information to answer question (6) and (7)

A random variable X has a mean $\mu = 10, \sigma^2 = 4$ and an unknown probability distribution.

6. The $P(|X - 10| \geq 3)$ is at most

   (a). $\frac{4}{9}$, (b). $\frac{5}{9}$, (c). $\frac{1}{9}$, (d). $\frac{8}{9}$.

   $\frac{741}{20825} + \frac{9139}{83300} +$

7. The $P(5 < X < 15)$ is at least

   (a). $\frac{4}{25}$, (b). $\frac{21}{25}$, (c). $\frac{1}{25}$, (d). $\frac{24}{25}$.

   $\frac{6327}{20825}$

8. Which of the following is not true about Bernoulli experiment?

   a. The experiment consists of n repeated trials.

   b. Each trial result in outcome classified as success or failure

   c. The probability of success remains constant from trial to trial

d. The random variable X is number of success in n trials.

9. The mean and variance of hypergeometric distribution with parameters N, n and k are respectively.

(a). $\mu = nk, \sigma^2 = nNk$, (b). $\mu = k,\ \sigma^2 = nN$,

(c). $\mu = \frac{nk}{N}$, $\sigma^2 = \frac{N-n}{N-1}$, (d). $\mu = \frac{Nk}{n}$, $\sigma^2 = \frac{N-n}{N-1}.N.\frac{k}{n}\left(1-\frac{k}{n}\right)$.

10. Which of the following distributions has same values for the estimate of the mean and variance.

(a). Negative Binomial (b). Binomial (c). Poisson (d). Multinomial.

11. The average number of oil tankers arriving each day at a facility is 5. Suppose the facility can handle at most 6 tankers per day, what is the probability that in a given day, tankers have to be turned away?

(a). 0.238 (b). 0.762 (c). 0.791 (d). 0.284

12. The following are properties of a distribution function except

a). $0 \leq F(x) \leq 1$ (b). F(x) is a non-decreasing function (c). F(x) is a non-increasing function, (d). $F(-\infty) = 0,\ F(\infty) = 1.$,

13. If A and B are independent then, which of the following is/are correct?

(I). $P(A\cap B) = P(A).P(B)$, (II). $P(A \mid B) = P(A)$, (III). $P(B \mid A) = \frac{P(A\cap B)}{P(A)}$

a. I only, (b). I and II, (c). II only, (d). All of the above

14. Two cards are drawn from a deck of 52 cards; find the probability that the second card is a heart.

b. $\frac{1}{2}$, (b). $\frac{1}{52}$, (c). $\frac{1}{4}$, (d). $\frac{12}{52}$

15. A fair die is tossed twice, find the probability of getting a 2, 4 or 6 on the first toss and 3, 4 or 5 on the second toss.

(a). $\frac{1}{4}$, (b). $\frac{3}{4}$, (c). $\frac{9}{4}$, (d). $\frac{12}{52}$

16. Arising from question (4), what can you say about the two events

(a). Dependent events, (b). Mutually exclusive Events, (c). Conditional Events, (d). Independent Events.

17. In a lots of 40 components each are called acceptable if they contain as many as 3 defectives or more. The procedure for sampling the lot is to select 5 components at random and to reject the lot if a defective is found. What is the probability that exactly 1 defective item is found in the sample if there are 3 defectives in the entire lots?

(a). 0.3011 (b). 089, (c). 0.4022, (d). 0.6078.

N = 40
n = 5

Use the following information to answer question (18) - (20)

Suppose a roll of 20 voters is taken in a city. The purpose is to determine x, the number who voted a candidate. Suppose that 60% of all the city's voters favor the candidate, Find

18. The mean and standard deviation respectively

(a). 10 and 2.4 (b). 12 and 2.19 (c). 12 and 4.8 (d). 10 and 2.19.

$\binom{20}{10}(0.6)^{10}(0.4)$

19. What is $P(X \leq 10)$?

(a). 0.416 (b). 0.642 (c). 0.314 (d). 0.245.

20. What is $P(X > 10)$?

(a). 0.755 (b). 0.645 (c). 0.245 (d). 0.455.

$\binom{n}{x} p^x q^{n-x}$

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE
DEPARTMENT OF SURVEYING AND GEOINFORMATICS

SVG 208 TUTORIAL QUESTIONS

1. Identify the attributes of the universe

2. What does the Solar System consists?

3. What is the use of the *Star Almanacs for Land Surveyors?*

4. What do you understand by the stars Constellations?

5. What is Spherical Excess?

6. With the aid of neat diagram, explain the Relationships between mean and sidereal time intervals

7. Name the 3 major Co-ordinate systems of the Celestial Sphere. Why do we the co-ordinates system?

8. Name the three basic categories of instruments used for observations in field and geodetic astronomy for the determination of latitude, longitude (time) and azimuth. Give Examples of each category

9. Identify 3 differences between Plane Triangle and Spherical Triangle.

10. Give reasons for Astronomical Azimuth determination.

11. a. In a spherical triangle *ABC*, prove from the first principle that:

    i. $\cos a = \cos b \cos c + \sin b \sin c \cos A$.

    ii. $\sin a/\sin A = \sin b/\sin B = \sin c/\sin C$.

    b. Two radio observatories wish to set up radio link. Their longitude and latitude are respectively $12^0\,18'\,24''$E, $53^0\,14'\,12''$N and $89^0\,50'\,12''$E, $38^0\,26'\,18''$N. In what angular direction to the North must the antenna at the second station be set to achieve the best transmission?

12. a With the aid of sketch, distinguish between small circle and great circle. Give an example of each circle.

    b. List the 3 major uses of Geodetic Astronomy.

    c. Draw a neat diagram of *semi-celestial* sphere and show the following: Celestial Horizon, Celestial equator, Hour circle, Vertical circle, Prime vertical, Zenith, North Pole, Almucantar circle, Observer's meridian and a heavenly body.

13. a. Outline the need for Astronomical Azimuth determination.
   b. In an Astronomical Triangle ZPS, identify the six parameters of the triangle.
   c. Derive an expression for the computation of the Astronomical angle of a body given the quantities in 3b above.

14. a. What do you understand by elongation of a star?
   b. State the conditions for the elongation of a star
   c. A star of declination $60^0\ 52'\ 34''$ N and Right ascension $11^h\ 02^m\ 21^s$ was observed at a station ($07^0\ 50'\ 30''$ N, $03^0\ 37'\ 00''$ E) at elongation.
   Calculate: (i) the altitude of elongation of the star
   (ii) the azimuth of the East and West elongation
   (iii) the hour angle of East and west elongation

15. a. Mention 5 methods of determining Latitude by astronomical method.
   b. A star was observed for latitude determination, and its corrected altitude was $32^0\ 20'\ 41''$. The declination of the star was $8^0\ 12'\ 12''$S and the hour angle was 3hours 43minutes 43seconds. Determine the latitude of the point of observation.

16. Despite the invention of Digital surveying instruments, Field Astronomy courses still remain in the Surveying curriculum in the higher institutions in Nigeria. Discuss.

NOTES

a. Maximum of 6 pages of A4 paper (double spacing) including references.
b. 12 point front – Times New Roman
c. Submit in two weeks

17. Calculate the azimuth and the hour angle of the star *Procyon* of declination 5^0N, when the zenith distance is 80^0 as seen by an observer in attitude 56^0N.

18. Determine the hour angle and the azimuth of the sun at sunrise when its declination is 18^0S the latitude of the place is 46^0S.

19. a. Derive an expression for the computation of Latitude in the equal altitude method of Astronomical latitude determination.
   b. A star of declination $30^0\ 25'\ 16''$N was observed at an altitude of $28^0\ 51'\ 32''$ east of the meridian. If the parallatic angle at the time of observation was 90^0. Determine the latitude of the station of observation as well as the azimuth and the hour angle of the star when it was observed.

20. a. What do you understand by elongation of a star?
   b. State the conditions for the elongation of a star
   c. A star of declination $60^0\ 52'\ 34''$ N and Right ascension $11^h\ 02^m\ 21^s$ was observed at a station ($07^0\ 50'\ 30''$ N, $03^0\ 37'\ 00''$ E) at elongation.
   Calculate: (i) the altitude of elongation of the star

OBAFEMI AWOLOWO UNIVERSITY ILE-IFE, NIGERIA
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
CSC 305 INTRODUCTION TO DATABASE SYSTEM
Harmattan MID Semester Examination 2021/2022 Academic Session November 2022

13/20

NAME: Adejuwon Olawaseun

Registration Number: TP21/22/H/0299

Fill in the gaps with the correct words

1. Changing from analysis (conceptual model) to implementation (physical model) means an instance in a model becomes a raw in a relation.
2. Data are raw facts
3. Integrated collection of files is a data base
4. Update statement modifies a record in a table.
5. Attribute are used for describing entities.
6. A superclass has attributes that are Common to subclasses.
7. The simplest type of file organisation is Heap file
8. Relative specifies the association between two or more entities.
9. Unit of data transfer between disk and memory is called a ~~byte~~ block
10. Retangle shape represents entity in ERD
11. Type of DB language used for granting and revoking user access is called Database Control language
12. A sequence of records is called a file
13. Subclass with more than one superclass is a Muplti
14. ERD with subtype is called EERD
15. A subtype entity must have a ______ entity and must inherit all Modula in the mother entity
16. S, From, and ______ are clauses used in SQL expression
17. What is the right word for utilizing a disk block Spanning

***************************** BEST OF LUCK************************************

17/20

OBAFEMI AWOLOWO UNIVERSITY ILE-IFE, NIGERIA
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
CSC 305 INTRODUCTION TO DATABASE SYSTEM
Harmattan MID Semester Examination 2021/2022 Academic Session November 2022

NAME: ADELEKE Ibrahim Adesola

Registration Number: TP21/22/H/0669

Fill in the gaps with the correct words

1. Changing from analysis (conceptual model) to implementation (physical model) means an instance in a model becomes a ~~record~~ row in a relation
2. Data are raw facts
3. Integrated collection of files is a Database
4. Update statement modifies a record in a table.
5. Attributes are used for describing entities.
6. A superclass has attributes that are Common to subclasses.
7. The simplest type of file organisation is Heap file
8. Relationship specifies the association between two or more entities
9. Unit of data transfer between disk and memory is called a Block.
10. Rectangle shape represents entity in ERD
11. Type of DB language used for granting and revoking user access is called Database Control Language
12. A sequence of records is called a File
13. Subclass with more than one superclass is a multiple Inheritance
14. ERD with subtype is called Enhanced Entity Relationship Diagram
15. A subtype entity must have a Unique entity and must inherit all attributes in the mother entity.
16. _____, _____, and _____ are clauses used in SQL expression
17. What is the right word for utilizing a disk block Spanning.

***************************** BEST OF LUCK ***********************************

...enlarged ends and derive

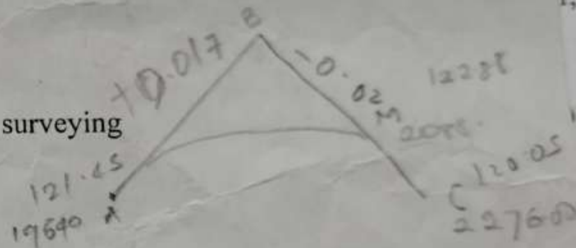
OBAFEMI AWOLOWO UNIVERSITY
DEPARTMENT OF SURVEYING AND GEOINFORMATICS
MID SEMESTER EXAMINATION 2018/2019 SESSION

Course Code: SVG 303 **Title: Engineering Surveying**

Instruction: Answer Questions 1 or 2 and 3 or 4. **Time Allowed: 40mins**

1. (i) Mention one of the precautions to take in the establishment of horizontal and vertical controls on a construction site. (4 marks)

   (ii) What is a record plan? (4 marks)



2. Explain with diagrams the following features of engineering surveying

   (i) A simple circular curve (5 marks)

   (ii) A compound curve (3 marks)

0 30 60 90

3. Two straights meet at an apex angle 126° 48′ and are to be joined by circular curve of 300 m radius. Calculate the data necessary to set out the curve using 30 m chord. Tabulate the data properly for field use (12 mks)

4. Two straights AB having gradient rising to the right at 1 in 60 and BC having gradient falling to the right at 1 in 50, are to be connected at a summit by a parabolic curve. The point A, reduced level 121.45 m, lies on AB at chainage 1964.00 m, and C, reduced level 120.05 m, lies on BC at chainage 2276.00 m. The vertical curve must pass through a point M, reduced level 122.88 at chainage 2088.00 m. Design the curve. (12mks)

5. (a) State the Law of Continuity and its assumption(s).

...tion has sectional area $25cm^2$, $60cm^2$ and $12cm^2$ at

OBAFEMI AWOLOWO UNIVERSITY

FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT

DEPARTMENT OF SURVEYING AND GEOINFORMATICS

2021/2022 HARMATTAN SEMESTER EXAMINATION

COURSE TITLE: Hydraulics for Surveyors **COURSE CODE:** SVG 315

TIME ALLOWED: 2 Hours **INSTRUCTION:** Answer any other **three questions**

1. (a) Discuss the working principles of the pressure gauge with enlarged ends and derive the expressions for its action. (10 marks)

(b) A hydraulic press has a ram of 15cm diameter and a plunger of 3cm diameter.

i. What force would be required on the plunger to raise a mass of 950kg? (5 marks)
ii. If the plunger has a stroke of 25cm, how many strokes will be required to lift the weight 50cm high? (5 marks)

2. Draw the hydrostatic pressure distribution diagram for a flood gate with fresh water at one side $\rho = 1000kg/m^3$, height of the water level is 12 metres and at the other side of sea water, $\rho = 1025kg/m^3$ for the case where pressure on either side is equal.
i. What will be the difference in height between the two water levels; and
ii. At what height will the resultant pressure force be zero. (20 marks)

$\rho g h$

3. (a) Describe the working principles of a venturimeter. (8 marks)

(b) A river flows with a velocity 2m/s through a channel of depth 6m. If at a point B, an obstruction of 2m was encountered at the river bed, determine the depth h_2 and velocity v_2 required to maintain a steady unit discharge. Sketch the profile. (12 marks).

4. Clearly describe the characteristics of the following types of flow
i. Turbulent flow
ii. Laminary flow
iii. Uniform flow
iv. Steady flow
v. Unsteady flow (20 marks)

$h_2 = \frac{2}{3} E_s$

$E_s = 1 +$

$E_s =$

$q = h\sqrt{2g}$

$q = hV$

5. (a) State the Law of Continuity and its assumption(s). (5 marks)

(b) A pipe of varying cross section has sectional area $25cm^2$, $60cm^2$ and $12cm^2$ at points X, Y and Z located at 15m, 12m and 2m respectively above datum. Z is the discharge nozzle

18.774

9.101

and the cross section X is connected to a tank filled with water to a height 20m above datum.

Calculate the

3.794

2.2×10^{-2} m^3/s

i. Discharge
ii. The velocity
iii. The pressure head at X, Y and Z assuming there are no energy losses (15 marks)

0.853

7.2803

0

SURVEYING AND GEOINFORMATICS DEPARTMENT
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
OBAFEMI AWOLOWO UNIVERSITY
ILE-IFE

Harmattan Semester Examination 2021/2022 Session
SVG 305: Elements of Geoinformatics

geometri
spatial

Answer any three questions. **Time Allowed: 2Hours**

1. a) Discuss the basic model of space. 12mks
   field
   object
   b) Discuss the various aspects of spatial relationship. 8mks
   metric
   Spatial order
   Topological.

2. a) Explain the various spatial dimensions applied in geoinformatics operations. 10mks
   b) If you are engaged to implement a geospatial database for cadastral application:
      I. What is the appropriate model of reality and why that choice?
      II. Identify the essential objects to be abstracted from the real world
      III. Give examples of the attribute data and how they can be collected 10mks

3. a) Discuss any 5 applications of geoinformation technology to national development. 10mks
   b) Identify the data acquisition process that would be required in (a) above, the equipment required and their uses 10mks

4. a) With the aid of a diagram, discuss the general processes involved in geoinformatics. 10mks
   b) Compare and contrast the general processes involved in geoinformatics and basic surveying. 10mks

5. a) Discuss the components of a geographic phenomenon. 10mks
   b) What are the key aspects of geospatial phenomenon? Briefly explain and give examples 10mks

C omputer aided
D
RS & photogrammetry
C artography
A

disencl

mutually
exclusive

OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE

DEPARTMENT OF PHYSICS AND ENGINEERING PHYSICS

B.Sc Hons (Physics) Degree Examination

2021/2022 Harmattan Semester Examination.

PHY311: Introduction to Astrophysics **Time Allowed: 2Hrs**

The Stefan Boltzmann's constant $\sigma = 5.7 \times 10^{8}\ w/m^2\ K^4$

SECTION A: Answer question 1 and any other one in this section (2 Questions)

1a. State and explain Kepler's laws regarding planetary motion.

b. Starting from the definition of an ellipse, with appropriate diagram, show that the distance 'r' of a planet moving in an elliptical orbit from one focus can be expressed as

$$r = \frac{a(1-e^2)}{1+e\cos\theta} \quad (0 \le e \le 1)$$

c. (i). Discuss the observers reference frame with respect to horizon, zenith, Nadir and meridian. What do you understand by altitude and azimuth? Use appropriate sketch to buttress your explanation.

(ii). Using appropriate diagram, discuss the celestial sphere with respect to declination and Right ascension. What do you understand by the term ecliptic?

(iii). The declination of star vega is given as $38^\circ 46' 24''$ write the declination of Vega in degree's unit alone.

60 3600

(iv). What is precession?

2a. List and discuss two types of telescopes you know

b. The amount of energy per second collected by the receiver of a radio telescope is given by;

$$P = \int_A \int_\nu S(\nu)\, f_\nu\, dA\, d\nu$$

Define each term in the expression indicating the appropriate units. Under what conditions can the expression be transformed to the form below?

$$P = SA\Delta\nu$$

c. What do you understand by the term "Stella Parallax"? Hence define parsec.

d. Given that the semi-major axis of Mar's orbit is 1.5237 AU and the planet's orbital eccentricity is 0.0934. What is the planet's distances from the sun at perihelion and Aphelion?

3a. (i). What is a black body?

(ii). State Wien's displacement law and illustrate it with an appropriate diagram.

b. Write down the expressions for the luminosity of a black body, define each term in the expression with their appropriate units.

$r^2 = b^2 -$

c. What is the radiant flux in Wm^{-2} from the sun as measured by an observer at a distance of 10pc given that 1pc = 2.0×10^5 AU and 1 AU = 1.5×10^{11} m?

d. Distinguish between the apparent and absolute magnitude of stars.

SECTION B: Answer any 2 Questions

Question4

a) Draw the Hertzsprung – Russel (H-R) diagram with all the axes labelled.
b) Explain the following using the quantities in (a) :
(i) Giant stars, (ii) a white dwarf and (iii) Super-giants

Question 5

a) Write short note on interstellar space
b) Comment on blackholes. State ways by which blackholes can be formed.
c) i) Explain accretion disk and write the expression for the Energy of the orbiting gas.
ii) Obtain the differential energy and luminosity of the outer and inner boundaries in c (i) for the disk.

Question 6

a) What are *Active Galactic Nuclei*?
b) Comments on the following:

(i) Elliptical galaxies (ii) Spiral galaxies (iii) Cosmology

c) The equation below provides an understanding of how a dust – filled universe with a spherical shell of uniform density (ρ) and radius (r) can be described :

$$v^2 - \frac{8}{3}\pi G\rho r^2 = -kc^2\tilde{\omega}^2$$

Assuming the present radius of the shell ($\tilde{\omega}$) is such that $\tilde{\omega} = r(t_0)$, V is the recessional velocity of the shell, K is about the geometry of the universe and other constants having their usual meanings. Discuss the possible scenario of the universe when: i) $K>0$ ii) $K<0$ and iii) $K=0$

OBAFEMI AWOLOWO UNIVERSITY
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
DEPARTMENT OF SURVEYING & GEOINFOMATICS

2021/2022 HARMATTAN SEMESTER EXAMINATIONS

COURSE TITLE: SVG 313: COMPUTER APPLICATIONS IN SURVEYING
INSTRUCTION: Answer question 1 and any other two Time: $2^1/_2$ Hours
Note: All the questions are based on Python 3 programming language

1. Given two different set of observations of same length;

a) Design a flow chart to find the Root Mean Square Error (RMSE), if the first set of observation is regarded as the true values and the second set are observed values. **(10 Marks)**

b) Convert the flow chart to Python 3 program using keyboard and monitor as the input and output devices respectively.

Hint: (i) User should input the first set of observations in a loop and add to a list, then input second set and also add to another list. Then find the RMSE of the corresponding observations in both list.

(ii) $RMSE = \sqrt{\frac{\sum(True\ values - Observed\ Values)^2}{n}}$ **(20 Marks)**

2. Debug the following program

```
#Creating a list
numb = []
#Prompting the user to enter the number of observations to consider
n = input("Enter Number of observations: ")
#Converting the input to integer
n=int(n)
#Creating the loop
For i in range():
    obs=input(f"Enter observation {i+1}: ")
    #Converting the observation input to float
    obs=float(obs)
    #Writing or appending the observation values into the list
    numb.append(obs1)
#Summing the numbers in the list
    s=sum(numb)
#Evaluating the most probable value (i.e. average)
ave=S/n
#Printing the result
    print("The MPV is", ave,"m")
```

Hint:

i. Indicate the errors in the program, clearly stating the line(s)/statement(s) containing the identified errors and
ii. Re-write the program correctly.

Sample of the Expected Results:
Enter Number of observations: 5
Enter observation 1: 4.5
Enter observation 2: 4.7
Enter observation 3: 4.8
Enter observation 4: 4.7
Enter observation 5: 4.6
The MPV is 4.659999999999999 m

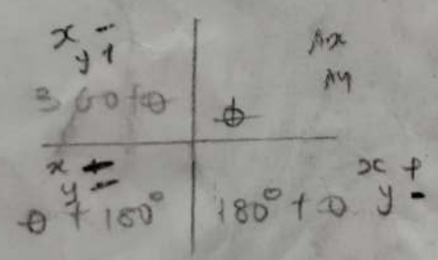
(15 Marks)

3. Given X and Y locations of two points, write a Python 3 program to calculate the bearing and distance of the first input point, A to the second point, B.
Hint: (i) Use math module for trigonometric calculation.
(ii) Consider signs of ΔN and ΔE as conditional statements when calculating bearing.
(15 Marks)

4. (a). The Zen of Python written by Tim Peters, is a collection of 19 "guiding principles" for writing computer programs that influence the design of the Python Programming Language. State any 10 of these. **(10 Marks)**
(b). Discuss the math operators used in programming including their applications and the order of operation. **(5 Marks)**

5. (a). Using **For loops**, write a program to read the repeated measurement of the distance between two control points; compute the average distance and write the measured and the average distance in an output file. **(10 Marks)**
(b). Discuss the conditional operators used in programming including their applications and the order of operation. **(5 Marks)**

beautiful is better than



Section B

Attempt all questions in this section. All undefined symbols have their usual meanings.

1. a. Solve the equation

$$\sqrt{3^x} + \frac{3}{\sqrt{3^x}} = 4.$$

0, 2

b. Let A and B be subsets of a finite universal set $\mathcal{U}$. Using an algebraic approach, show that

(i). $A = (A - B) \cup (A \cap B)$.

(ii). $(A - B) \cap (A \cap B) = \phi$.

$(A \cap B') \cap (A \cap B)$

Hence, using the two identities above, show that

$A \cap A$

$$n(A \triangle B) + 2n(A \cap B) = n(A) + n(B)$$

where $\triangle$ denotes set symmetric difference operator, and $n(X)$ denotes the cardinality of set X.

2. a. If the coefficients of x^5 and x^{15} in the expansion

$$\left(2x^2 + \frac{a}{x^3}\right)^{10}$$

$(n+3) + (n-3$

are equal, find a positive value of a.

$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

$(2+3) + ($

b. Let $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 3 & 4 & 2 \end{pmatrix}$.

(i). Show that $A^3 - 6A^2 + I = 0$, where I is the 3×3 identity matrix, and 0 is the 3×3 zero matrix.

(ii). Using the equation in 2b (i). above, find A^{-1}.

Hence, find the values of x, y and z which satisfy the system of equations

$$x + 2y + z = 1,$$
$$2x + 3y + z = 4,$$
$$3x + 4y + 2z = 4.$$

$(A - B) \cup (B - A)$

$3 + \frac{3}{3}$

Ad

$2+3)$

$(A+B) \times (C+D)$ Det

$A \triangle B = (A - B) + (A+$

$AC + AD$

$(n-1)(n-$

S