

**UNIVERSITI KUALA LUMPUR**

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**FINAL EXAMINATION  
JANUARY 2016 SEMESTER**

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**SUBJECT CODE** : WQD10203  
**SUBJECT TITLE** : TECHNICAL MATHEMATICS 2  
**LEVEL** : DIPLOMA  
**TIME / DURATION** : 9.00 am – 11.30 am  
( 2 ½ HOURS )  
**DATE** : 19 MAY 2016

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper CAREFULLY.
  2. This question paper is printed on both sides of the paper.
  3. Please write your answers on the answer booklet provided.
  4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
  5. This question paper consists of THREE (3) parts. Part A, B and C. Answer all questions in Part A and B. For Part C, answer two (2) questions only.
  6. Answer all questions in English.
  7. Formula Sheet is appended.
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THERE ARE 9 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

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## PART A (Total: 15 marks)

## MULTIPLE CHOICE QUESTIONS

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

1. Determine the amplitude of  $y = -3\cos\left(2x - \frac{\pi}{4}\right)$ .

- A.  $-3$
- B.  $3$
- C.  $2x$
- D.  $-\frac{\pi}{4}$

2. Simplify the trigonometric expression  $\frac{1}{\tan\theta} + \tan\theta$ .

- A.  $\frac{\cos\theta}{\sin\theta}$
- B.  $\frac{1}{\sin\theta}$
- C.  $\frac{1}{\cos\theta}$
- D.  $\frac{1}{\sin\theta\cos\theta}$

3. Solve  $3\sin\theta = 1$

- A.  $19.47^\circ, 160.53^\circ$
- B.  $19.47^\circ, 199.47^\circ$
- C.  $160.47^\circ, 199.47^\circ$
- D.  $160.47^\circ, 340.53^\circ$

4. Let  $k(x) = \begin{cases} 4 & \text{for } x < -3 \\ x - 2 & \text{for } -3 \leq x < 2. \\ x^2 & \text{for } x \geq 2 \end{cases}$
- Determine  $k(-5)$
- A. 4  
B. 1  
C. -3  
D. -1
5. Given  $f(x) = 3x$  and  $g(x) = e^x$ , compute  $(g \circ f)(x)$ .
- A.  $3xe^{3x}$   
B.  $3e^x$   
C.  $3xe^x$   
D.  $e^{3x}$
6. Determine  $\lim_{r \rightarrow 3} \frac{r^2 - 9}{r - 3}$
- A. 0  
B. 6  
C. Undefined  
D. 3
7. Differentiate  $y$  with respect to  $x$  for  $y = e^{2x+1}$
- A.  $(2x + 1)e^{2x+1}$   
B.  $2e^2$   
C.  $2e^{2x+1}$   
D.  $2xe^{2x+1}$

8. The differentiation of  $\cot(3x^2 - 4)$  with respect to  $x$  is

- A.  $-6\csc^2(3x^2 - 4)$
- B.  $-4x\csc^2(3x^2 - 4)$
- C.  $-6x\csc^2(3x^2 - 4)$
- D.  $-4\csc^2(3x^2 - 4)$

9. Determine  $\frac{dy}{dx}$  of  $y = \ln(2x - 3)^4$ .

- A.  $4\ln(2x - 3)^3$
- B.  $8\ln(2x - 3)^3$
- C.  $\frac{6}{(2x - 3)^3}$
- D.  $\frac{8}{2x - 3}$

10. Given  $g(x) = \sqrt[3]{x^2 - 10}$ . Determine  $g'(x)$ .

- A.  $\frac{2x}{3}(x^2 - 10)^{-\frac{2}{3}}$
- B.  $\frac{2x}{3}(x^2 - 10)^{\frac{2}{3}}$
- C.  $\frac{x}{2}(x^2 - 10)^{-\frac{2}{3}}$
- D.  $x(x^2 - 10)^{-\frac{2}{3}}$

11. Choose the correct formula of differentiation using quotient rule.

- A.  $\frac{g'(x)f(x) - g(x)f'(x)}{(g(x))^2}$
- B.  $f(x)g'(x) + g(x)f'(x)$
- C.  $\frac{g(x)f'(x) - g'(x)f(x)}{(g(x))^2}$
- D.  $f(x)g'(x) - g(x)f'(x)$

12. The integration of  $y = (1 - 4x)^2$  is

A.  $\frac{(1-4x)^3}{-12} + C$

B.  $\frac{(1-4x)^3}{12} + C$

C.  $\frac{(1-4x)}{8} + C$

D.  $\frac{(1-4x)^3}{8} + C$

13. If  $\int_a^b f(x) dx = d$  and  $\int_b^c f(x) dx = -e$ , evaluate  $\int_a^c (f(x) + 1) dx$ .

A.  $a + b + c + d - e$

B.  $-a + b + c + d$

C.  $a + b + c$

D.  $-a + c + d - e$

14.  $\int_1^2 (2x - 3) dx$

A.  $-1$

B.  $0$

C.  $1$

D.  $2$

15. If  $\int_1^2 f(x) dx = 5$ , then  $\int_2^1 f(x) dx =$

A.  $5$

B.  $1$

C.  $2$

D.  $-5$

**PART B (Total: 45 marks)****INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

a) Show  $\frac{1 + \sec x}{\csc x} = \sin x + \tan x$ .

[4 marks]

b) Given  $\sin \alpha = -\frac{5}{13}$ , determine the exact value of  $\cos 2\alpha$  where  $\alpha$  is in the third quadrant.

[3 marks]

**Question 2**Given  $f(x) = -2x + 3$  and  $g(x) = 2x^2 + 5x - 1$ , evaluate

a)  $(f - g)(-1)$

[2 marks]

b)  $(g \circ f)(x)$

[3 marks]

### Question 3

Given the function defined by the Figure 1.

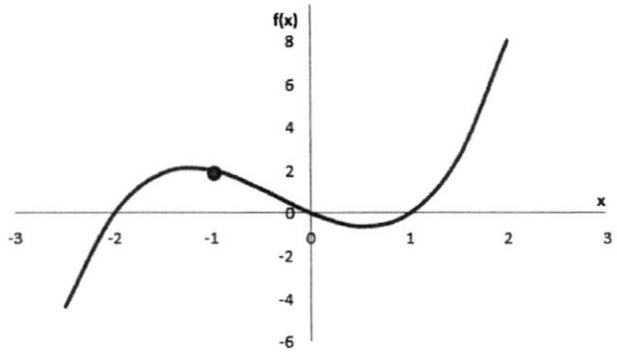


Figure 1

a) Determine each of the following;

i.  $\lim_{x \rightarrow -1^-} f(x)$

ii.  $\lim_{x \rightarrow -1^+} f(x)$

iii.  $\lim_{x \rightarrow -1} f(x)$

iv.  $f(-1)$

b) Determine whether the function  $f(x)$  is continuous at  $x = -1$ .

### Question 4

Given  $f(x) = \frac{x^3 + 3x}{x^2 - 2}$ . Determine  $f'(x)$ .

**Question 5**

Differentiate  $f(x) = 2x^2 + 35$  by using the definition of derivative.

[Hint: use formula  $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ ]

[8 marks]

**Question 6**

Evaluate  $\int_1^9 \frac{2x^2 + x^2\sqrt{x} - 1}{x^2} dx$ .

[6 marks]

**Question 7**

Determine  $\int \frac{x^2 + 1}{(x+3)(x-1)} dx$  by using integration by partial fraction.

[8 marks]



## PART C (Total: 40 marks)

INSTRUCTION: Answer TWO questions.

Please use the answer booklet provided.

## Question 1

a) Given  $y = \frac{1}{2} \cos(3x)$

- i. State the period and amplitude of
- $y$
- .

[2 marks]

- ii. Sketch the graph for
- $0 \leq x \leq \pi$
- .

[8 marks]

b) Given  $f(x) = \frac{3x+8}{2x-p}$ , and  $f(1) = 5$ . Determine the value of  $p$ .

[5 marks]

c) Given  $h(x) = \frac{x+4}{2x-5}$ . Calculate the inverse function of  $h(x)$  at the point  $x = -1$ .

[5 marks]

## Question 2

a) If  $y^5 - x^2y^3 = 1 + e^{x^2}$ , determine  $\frac{dy}{dx}$  at point  $(0, 1)$ .

[10 marks]

- b) A water tank has a shape of an inverted circular cone with base radius 2 m and height 5m as shown in Figure 2. If water is being pumped into the tank at a rate of
- $0.2 \text{ m}^3/\text{min}$
- . Calculate the rate of change at which the water level is rising when the water is 3m deep.

[Hint Volume of cone =  $\frac{1}{3}\pi r^2 h$ ]

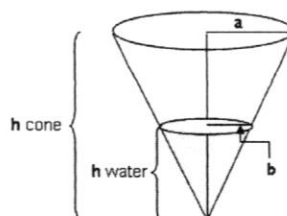


Figure 2

[10 marks]

## Question 3

- a) Evaluate  $\int_0^1 x \sin(10x) dx$ , by using integration by parts.

[7 marks]

- b) A cup is made by rotating the area between  $y = 2x^2$  and  $y = x + 1$  with value of  $x \geq 0$  around the x-axis in Figure 3. Calculate the volume of the material needed to make the cup.

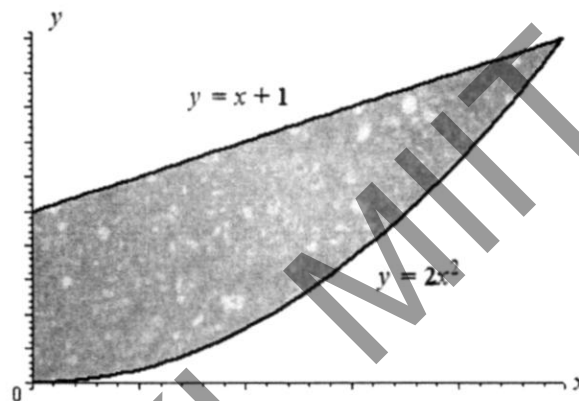


Figure 3

[13 marks]

END OF QUESTION

## FORMULA SHEET

## TRIGONOMETRY IDENTITIES

| FUNDAMENTAL IDENTITIES  | FORMULAS FOR NEGATIVES         |
|---|--------------------------------|
| $\csc \theta = \frac{1}{\sin \theta}$                                   | $\sin(-\theta) = -\sin \theta$ |
| $\sec \theta = \frac{1}{\cos \theta}$                                   | $\cos(-\theta) = \cos \theta$  |
| $\cot \theta = \frac{1}{\tan \theta} = \frac{\cos \theta}{\sin \theta}$ | $\tan(-\theta) = -\tan \theta$ |
| $\tan \theta = \frac{\sin \theta}{\cos \theta}$                         | $\csc(-\theta) = -\csc \theta$ |
| $\sin^2 \theta + \cos^2 \theta = 1$                                     | $\sec(-\theta) = \sec \theta$  |
| $1 + \tan^2 \theta = \sec^2 \theta$                                     | $\cot(-\theta) = -\cot \theta$ |
| $1 + \cot^2 \theta = \csc^2 \theta$                                     |                                |

| ADDITION FORMULAS   | SUBTRACTION FORMULAS                                      |
|---|---|
| $\sin(A + B) = \sin A \cos B + \cos A \sin B$             | $\sin(A - B) = \sin A \cos B - \cos A \sin B$             |
| $\cos(A + B) = \cos A \cos B - \sin A \sin B$             | $\cos(A - B) = \cos A \cos B + \sin A \sin B$             |
| $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$ | $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$ |

| DOUBLE-ANGLE FORMULAS  |
|--|
| $\sin 2\theta = 2 \sin \theta \cos \theta$   |
| $\cos 2\theta = \cos^2 \theta - \sin^2 \theta$<br>..... = $1 - 2 \sin^2 \theta$<br>..... = $2 \cos^2 \theta - 1$ |
| $\tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$   |

## DIFFERENTIATION

| STANDARD FORM                           | GENERAL FORM   |
|---|--|
| $\frac{d}{dx}(\sin x) = \cos x$         | $\frac{d}{dx}(\sin f(x)) = f'(x) \cos f(x)$            |
| $\frac{d}{dx}(\cos x) = -\sin x$        | $\frac{d}{dx}(\cos f(x)) = -f'(x) \sin f(x)$           |
| $\frac{d}{dx}(\tan x) = \sec^2 x$       | $\frac{d}{dx}(\tan f(x)) = f'(x) \sec^2 f(x)$          |
| $\frac{d}{dx}(\csc x) = -\csc x \cot x$ | $\frac{d}{dx}(\csc f(x)) = -f'(x) \csc f(x) \cot f(x)$ |
| $\frac{d}{dx}(\sec x) = \sec x \tan x$  | $\frac{d}{dx}(\sec f(x)) = f'(x) \sec f(x) \tan f(x)$  |
| $\frac{d}{dx}(\cot x) = -\csc^2 x$      | $\frac{d}{dx}(\cot f(x)) = -f'(x) \csc^2 f(x)$         |

## EXPONENTIAL FUNCTION

| STANDARD FORM           | GENERAL FORM                           |
|-------------------------|--|
| $\frac{d}{dx}e^x = e^x$ | $\frac{d}{dx}e^{f(x)} = f'(x)e^{f(x)}$ |

## LOGARITHMIC FUNCTION

| STANDARD FORM                      | GENERAL FORM                                 |
|------------------------------------|--|
| $\frac{d}{dx} \ln x = \frac{1}{x}$ | $\frac{d}{dx} \ln f(x) = \frac{f'(x)}{f(x)}$ |

## INTEGRATION

| STANDARD FORM                            | GENERAL FORM<br>Where : $f(x) = ax + b$                         |
|--|---|
| $\int \cos x \, dx = \sin x + c$         | $\int \cos f(x) \, dx = \frac{\sin f(x)}{f'(x)} + c$            |
| $\int \sin x \, dx = -\cos x + c$        | $\int \sin f(x) \, dx = \frac{-\cos f(x)}{f'(x)} + c$           |
| $\int \sec^2 x \, dx = \tan x + c$       | $\int \sec^2 f(x) \, dx = \frac{\tan f(x)}{f'(x)} + c$          |
| $\int \sec x \tan x \, dx = \sec x + c$  | $\int \sec f(x) \tan f(x) \, dx = \frac{\sec f(x)}{f'(x)} + c$  |
| $\int \csc x \cot x \, dx = -\csc x + c$ | $\int \csc f(x) \cot f(x) \, dx = \frac{-\csc f(x)}{f'(x)} + c$ |
| $\int \csc^2 x \, dx = -\cot x + c$      | $\int \csc^2 f(x) \, dx = \frac{-\cot f(x)}{f'(x)} + c$         |

## EXPONENTIAL FUNCTION

| STANDARD FORM              | GENERAL FORM<br>Where : $f(x) = ax + b$            |
|----------------------------|--|
| $\int e^x \, dx = e^x + c$ | $\int e^{f(x)} \, dx = \frac{e^{f(x)}}{f'(x)} + c$ |

## LOGARITHMIC FUNCTION

| STANDARD FORM                         | GENERAL FORM<br>Where : $f(x) = ax + b$                   |
|---------------------------------------|---|
| $\int \frac{1}{x} \, dx = \ln x  + c$ | $\int \frac{1}{f(x)} \, dx = \frac{\ln f(x) }{f'(x)} + c$ |

## INTEGRATION BY PART

|                                    |
|------------------------------------|
| $\int u \, dv = uv - \int v \, du$ |
|------------------------------------|



MALAYSIA INSTITUTE OF INFORMATION TECHNOLOGY

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**FINAL EXAMINATION  
JANUARY 2016 SEMESTER**

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**SUBJECT CODE** : IFD20203  
**SUBJECT TITLE** : FUNDAMENTALS OF VOICE & DATA CABLING  
**LEVEL** : DIPLOMA  
**TIME / DURATION** : 9.00 am – 11.00 am  
( 2 HOURS )  
**DATE** : 26 MAY 2016

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper CAREFULLY.
  2. This question paper is printed on both sides of the paper.
  3. This question paper consists of TWO (2) parts. Part A and B.
  4. Answer ALL questions.
  5. Please write your answers on the OMR form and answer booklet provided.
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THERE ARE 10 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

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23. Why is CAT 6 cable preferred over CAT 5e cable?
- A. The jacket is thicker and can be used underground
  - B. The cable pairs are separated by thicker insulation
  - C. The jacket colour is better matched to the cable pairs
  - D. The higher twist rate allows the cable to resist interference better
24. What is the meaning of the acronym STP?
- A. Shielded Twinax Pair
  - B. Shielded Twisted Pair
  - C. Strung Twisted Pair
  - D. Smart Twisted Pair
25. A supervisor instruct a cable installer to open a box of category 5e cable and ensure that there is enough cable for a 89-meter horizontal cable run. The starting number on the box is 12497 and the ending number is 12801. The current number on the end of the cable is 12587. How much cable is present in the box?
- A. 114 m
  - B. 164 m
  - C. 214 m
  - D. 224 m
26. Cables should be marked two to three times to help ensure proper identification. Approximately how far apart should the markings be spaced?
- A. 0.1m(0.3 ft)
  - B. 0.5m (1.5 ft)
  - C. 0.3m (0.9 ft)
  - D. 1m (3ft)
27. Installers used to bind cables together in tight geometric patterns such as squares or rectangles. What is a disadvantage of tying cables together for long distances in these uniform parallel arrays?
- A. It exerts stress on the cables and could cause bend radius problems
  - B. It eliminates cross talk between cables
  - C. It promotes the induction of electrons from high voltage line
  - D. It looks messy and unorganised
28. Which type of cabling always runs between MC and the IC?
- A. backbone cabling
  - B. fiber optic cabling
  - C. plenum cabling
  - D. horizontal cross connect cabling
29. State the minimum number of TR walls that should be covered with 20 mm A-C plywood
- A. 1
  - B. 2
  - C. 3
  - D. 4

30. Which EIA/TIA standard specifies procedures for grounding and bonding?
- A. TIA/EIA 568-A      C. TIA/EIA 607  
B. TIA/EIA 569-A      D. TIA/EIA 606
31. Which cable is wired TIA/EIA 568A on one end, while the other end is TIA/EIA 568B
- A. crossover cable      C. straight through cable  
B. rollover cable      D. null modem cable
32. Which type of cable maps a wire to the same pin on both ends
- A. Split through cable      C. straight twisted-pair cable  
B. straight twist cable      D. straight through cable
33. What is the proper way to label a punch down block in the TR (room 25) for a cable that runs to a computer wall jack located in Zairil's office (room 112)?
- A. 25A      C. 112A  
B. Nazri      D. Computer
34. How do we locate the other end of the cable in a wiring closet?
- A. By doing a figure 8 loop to the cable  
B. By tapping lightly on the cable jacket  
C. Using a fish tape  
D. By doing a pull check on a cable
35. What is normally done during the finish phase of a project?
- A. cable raceway are installed  
B. backbone cable is installed  
C. wiring is terminated  
D. testing of cable is completed
36. Which document shows how the patch panels are installed in the racks?
- A. layout diagram  
B. cut sheet  
C. equipment diagram  
D. schematic diagram
37. At what phase of the installation is the pulling of distribution cabling done?
- A. Rough in      C. Finish  
B. Trim out      D. Customer support

38. Which of the following documents is done to describe The up to date description of a cabling project?
- A. RFPs
  - B. as-built
  - C. Blueprints
  - D. cut sheets
39. What is the maximum segment length for 10Base5?
- A. 200 metres
  - B. 100 metres
  - C. 185 metres
  - D. 500 metres
40. What is the IEEE standard for Ethernet?
- A. 802.1
  - B. 802.3
  - C. 802.5
  - D. 802.11
41. What does the letter after the decimal value in 802.11g indicate?
- A. it is used to address a change in security technology standard
  - B. it is used to address a change in CSMA/CD technology standard
  - C. it is used to address a change in wireless technology standard
  - D. it is used to address a change in demand priority access method technology standard
42. What is the maximum recommended fill capacity for conduit?
- A. 70 percent
  - B. 60 percent
  - C. 50 percent
  - D. 40 percent
43. Matt is pushing a fish tape inside of a conduit and it becomes stuck. What should he do?
- A. run another fish tape from the other end of the conduit
  - B. pull the tape back and start over again
  - C. rotate the fish tape while pushing it
  - D. use a cable winch to pull the tape through the conduit
44. Which of these is a type of Wi-Fi network?
- A. 802.11ap
  - B. 802.11q
  - C. 802.11ac
  - D. 802.11m

45. Where should a fiber optic service coil be stored?
- A. in the wall spaces
  - B. tightly coiled in the wall outlet
  - C. above the ceiling tiles
  - D. in a box in the TR
46. What are the two types of coax cable connectors?
- A. RJ 45 and RJ 48
  - B. RG 6 and RG58
  - C. BNC and F
  - D. RG 58 and RG 62
47. Which method can be used to reduce Near End crosstalk?
- A. Don't terminate at all
  - B. Minimize cable length
  - C. Minimise the amount of untwist in the cable
  - D. Maximise the amount of untwist in the cable
48. What is the best way to correct a split pair?
- A. replace the cable with a lower grade CAT rating
  - B. replace the cable with a larger grade CAT rating
  - C. re-terminate the connector
  - D. re-pull the entire cable
49. Why would fiber optic installations be favoured over copper between buildings?
- A. cheaper installation
  - B. larger capacity compared to copper
  - C. Uses electricity to send signals
  - D. easier termination and installation
50. Which of the following is a conductor for electricity?
- A. Dry Wood
  - B. PVC
  - C. Water without ions
  - D. Water with ions

## SECTION B (Total: 50 marks)

INSTRUCTION: Answer ALL questions.  
Please use the answer booklet provided.

## Question 1

- a. Expand the following acronyms ( 7 marks )
- i. AWG
  - ii. IC
  - iii. MAC
  - iv. EMI
  - v. OSI
  - vi. NEXT
  - vii. POTS
- b. Briefly describe what is meant by demarcation point(demarc) ( 3 marks )
- c. Briefly describe **TWO(2)** properties of copper listed below:  
i. Malleability  
ii. Ductility ( 5 marks )
- e. List down the colour codes for terminating T568A according to the correct sequence ( 5 marks )
- f. List down **FIVE(5)** benefits of networking computers ( 5 marks )

[Total: 25 marks]

## Question 2

- a. There are four rules of structured cabling system. briefly describe with example the following rules:
- i. Plan for growth
  - ii. Be complete
- (6 marks)
- b. State the ideal Temperature and humidity levels that need to be maintained in a Telecommunication Room.
- (2 marks)
- c. State whether the following statements are **true** or **false**.
- i. "A rollover cable is used to configure routers."
  - ii. "When connecting a PC with a switch, straight through termination (T568B) must be used"
  - iii. "RFP stands for Request for Proposal"
  - iv. "Fibre optic cables are commonly used as Backbone cabling in a network"
  - v. "Common errors in terminating cables includes opens, shorts, split pairs and wiremapping errors."
  - vi. "Tone generator and probe are used in identifying unlabeled or mislabeled cables."
- (6 marks)
- d. List **FIVE(5)** examples of insulator used in copper cables
- (5 marks)
- e. Briefly explain why we need to remove old, abandon cables from the project site when installing new cables?
- (2 marks)
- f. List down **FOUR(4)** items that is commonly found in a RFP Documents
- (4 marks)

[ Total: 25 marks]

**END OF QUESTIONS**