
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session of 2007/2008

October/November 2007

EBB 405E – Non-Destructive Testing **[Ujian Kegagalan Tak Musnah]**

Duration: 3 hours
[Masa: 3 jam]

Please ensure that this paper consists of TWENTY SIX printed pages before you proceed with the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi DUA PULUH ENAM muka surat yang bercetak sebelum anda memulakan peperiksaan.]

This paper contains THIRTY objective questions and TWENTY True/False questions from PART A and SEVEN subjective questions from PART B.

[Kertas soalan ini mengandungi TIGA PULUH soalan objektif dan DUA PULUH soalan Benar/Palsu dari BAHAGIAN A dan TUJUH soalan subjektif dari BAHAGIAN B.]

Instruction: Answer **ALL** questions from PART A and answer any four questions from PART B. If a candidate answers more than four questions, only the first four questions answered will be examined and awarded marks.

[Arahan: Jawab **SEMUA** soalan dari BAHAGIAN A dan mana-mana **EMPAT (4)** soalan dari BAHAGIAN B. Jika calon menjawab lebih daripada empat soalan hanya empat soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah.]

Answers to any question must start on a new page.

[Mulakan jawapan anda untuk setiap soalan pada muka surat yang baru.]

You may answer a question either in Bahasa Malaysia or in English.

[Anda dibenarkan menjawab soalan sama ada [untuk KBI] dalam Bahasa Malaysia atau Bahasa Inggeris.]

PART A.
BAHAGIAN A.

From 1 to 30 select the most appropriate answer.
Daripada 1 hingga 30, pilih jawapan yang bersesuaian.

1. The protective spray can be removed later using:
- [A] Trichloroethylene.
 - [B] Water.
 - [C] Acetone.
 - [D] Oil.

Semburan pelindung boleh dibuang kemudian menggunakan:

- [A] *Tri-kloroethilene.*
- [B] *Air.*
- [C] *Aceton.*
- [D] *Minyak.*

2. In any failure analysis investigation some features should be recorded include:
- [A] Origin of failure.
 - [B] Location of stress concentrators.
 - [C] Direction of crack propagation.
 - [D] All of the above.

Dalam pemeriksaan analisis kegagalan beberapa ciri sepatutnya direkod termasuklah:

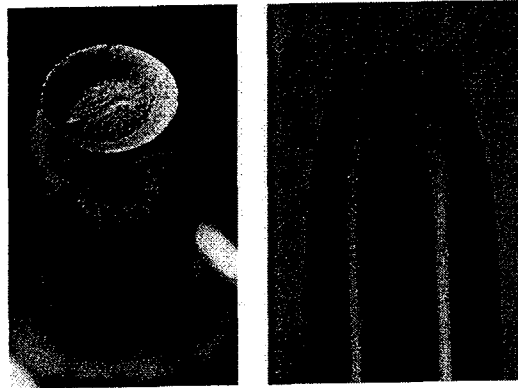
- [A] *Asalan kegagalan.*
- [B] *Lokasi penumpu tegasan.*
- [C] *Arah bagi perambatan retakan.*
- [D] *Semua di atas.*

3. The fracture surface below is:

- [A] Creep fracture.
- [B] Ductile.
- [C] Brittle.
- [D] Fatigue.

Permukaan patah di bawah adalah:

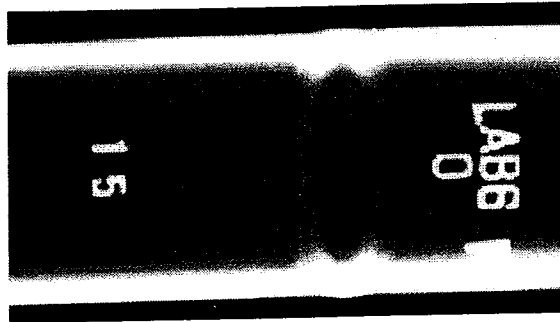
- [A] *Patah rayapan.*
- [B] *Mulur.*
- [C] *Rapuh.*
- [D] *Lesu.*



4. The radiographic bellow is:
- [A] Weld spatter.
 - [B] External under cut.
 - [C] Burn through.
 - [D] Scatter porosity.

Radiografik di bawah adalah:

- [A] Percikan kimpalan.
- [B] Kurang-potongan luaran.
- [C] Keseluruhan bakaran.
- [D] Keliangan percikan.



5. Vapour degreasing is used to remove organic contaminants such as:
- [A] Varnish.
 - [B] Rust.
 - [C] Grease.
 - [D] All of the above.

Penyah-grisan wap digunakan dalam pembuangan bahan cemar organik seperti:

- [A] Varnis.
- [B] Karat.
- [C] Gris.
- [D] Semua di atas.

6. If the wrong cleaning material is used; the part may be damaged due to:
- [A] Rusting.
 - [B] Residue on the surface.
 - [C] Corrosion.
 - [D] All of the above.

Sekiranya bahan cucian yang salah digunakan, bahagian mungkin dimusnahkan disebabkan oleh:

- [A] Pengaratan.*
- [B] Bakian di atas permukaan.*
- [C] Kakisan.*
- [D] Semua di atas.*

7. When using shot or grit blasting, it is important to remember that the blasting operation may:
- [A] Peen over the metal.
 - [B] Etch the metal.
 - [C] Stress the metal allowing premature cracking.
 - [D] Detect subsurface discontinuities.

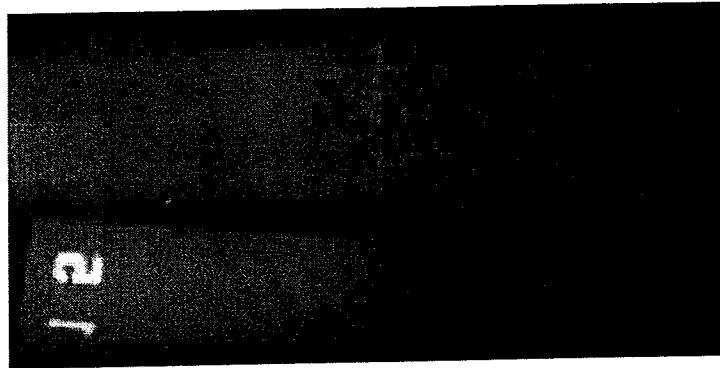
Apabila menggunakan pembagasan butir ataupun grit, adalah penting diingatkan bahawa operasi pembagasan mungkin:

- [A] Mengepin logam.*
- [B] Memunar logam.*
- [C] Menegang logam dan membenarkan retakan pra-matang.*
- [D] Mengesan kecacatan bawah-permukaan.*

8. The radiographic bellow is:
- [A] Cluster Porosity.
 - [B] Random Porosity.
 - [C] External Undercut.
 - [D] Internal Undercut.

Radiographik di bawah adalah:

- [A] *Keliangan Gugusan.*
- [B] *Keliangan Rawak.*
- [C] *Kurang-potongan Luaran.*
- [D] *Makan-bawah Dalaman.*



9. Small holes or threaded parts may be plugged with a small amount of:
- [A] Varnish.
 - [B] Penetrant.
 - [C] Paint.
 - [D] Nonferromagnetic material.

Lubang kecil ataupun bahagian bebunga mungkin boleh dipalam dengan sebahagian kecil:

- [A] *Varnis.*
- [B] *Bahan Penusuk.*
- [C] *Cat.*
- [D] *Bahan tak-ferromagnetik.*

10. When a part has not been magnetized:
- [A] The magnetic domains are not orientated in any particular direction.
 - [B] The magnetic domains are aligned between the north and south poles.
 - [C] The magnetic domains repel each other.
 - [D] The part becomes more conductive.

Apabila bahagian tidak dimagnetkan:

- [A] *Magnetik domain tidak diorientasi dalam mana-mana arah tertentu.*
- [B] *Magnetik domain dijajarkan diantara kutub utara dan selatan.*
- [C] *Magnetik domain menolak antara satu sama lain.*
- [D] *Bahagian menjadi lebih konduktif.*

11. The objective of magnetic particle testing is to:
- [A] Obtain a visual image of an indication on the surface of a material.
 - [B] Disclose the nature of a discontinuity without impairing the part's usefulness.
 - [C] Determine acceptable from rejectable discontinuities.
 - [D] All of the above apply.

Objektif Pengujian Serbuk Magnetik adalah untuk:

- [A] *Memperolehi imej ternampak bagi penanda pada permukaan bahan.*
- [B] *Menyingkap tabiat kecacatan tanpa melemahkan kegunaan bahagian.*
- [C] *Menentukan keboleh-terimaan daripada kecacatan yang boleh-ditolak.*
- [D] *Semua di atas adalah diaplikasikan.*

12. The north and south poles of a magnet will:
- [A] Repel each other.
 - [B] Attract towards each other.
 - [C] Attract or repel depending on the orientation of the domains.
 - [D] Create a flux capacitance.

Kutub Utara dan Selatan bagi magnet akan:

- [A] *Menolak antara satu sama lain.*
- [B] *Menarik ke arah satu sama lain.*
- [C] *Menarik atau menolak bergantung kepada orientasi domain.*
- [D] *Menghasilkan fluk kapasitan.*

13. Which type of material has a slight repelling effect when a magnetic field is applied?
- [A] Diamagnetic materials.
 - [B] Paramagnetic materials.
 - [C] Ferromagnetic materials.
 - [D] Sterromagnetic materials.

Yang manakah jenis bahan yang mempunyai sedikit kesan penolakan apabila medan magnetik dikenakan?

- [A] *Bahan Diamagnetik.*
- [B] *Bahan Paramagnetik.*
- [C] *Bahan Ferromagnetik.*
- [D] *Bahan Steromagnetik.*

14. A crack will disrupt the lines of force creating:

- [A] Flux leakage.
- [B] Coercive force.
- [C] Magnetic flux.
- [D] Resistive force.

Suatu retakan akan mengganggu garisan daya dengan menghasilkan:

- [A] Bocoran Fluk.*
- [B] Daya paksaan.*
- [C] Fluk Magnetik.*
- [D] Daya Resistif.*

15. The ease in which a material can be magnetized is called:

- [A] Permeability.
- [B] Reluctance.
- [C] Residual magnetism.
- [D] Retentivity.

Kemudahan bagi bahan untuk dimagnetkan dipanggil:

- [A] Kebolehtelapan.*
- [B] Reluctan.*
- [C] Magnetisms bakian.*
- [D] Ketersimpanan.*

16. High carbon steel that has been magnetized would have:
- [A] High permeability.
 - [B] Low reluctance.
 - [C] Low residual magnetism.
 - [D] High coercive force.

Keluli berkarbon Tinggi yang dimagnetkan mempunyai:

- [A] *Permeabiliti/ Kebolehtelapan tinggi.*
- [B] *Reluktan rendah.*
- [C] *Pemagnetan bakian rendah.*
- [D] *Daya paksaan tinggi.*

17. Low carbon steel that has been magnetized would have:
- [A] High permeability.
 - [B] High reluctance.
 - [C] High residual magnetism.
 - [D] High coercive force.

Keluli berkarbon rendah yang dimagnetkan mempunyai:

- [A] *Permeabiliti/ Kebolehtelapan tinggi.*
- [B] *Reluktan tinggi.*
- [C] *Pemagnetan bakian tinggi.*
- [D] *Daya paksaan tinggi.*

18. A circular magnetic field can be induced into a part by:
- [A] Direct induction.
 - [B] Central induction.
 - [C] Reverse induction.
 - [D] Residual induction.

Medan magnetik membulat boleh diaruhkan kepada bahagian dengan:

- [A] Pengaruhannya terus.*
- [B] Pengaruhannya pusat.*
- [C] Pengaruhannya terbalik.*
- [D] Pengaruhannya bakian.*

19. What direction are the magnetic lines of force in relation to the direction of the current?
- [A] 25 degrees.
 - [B] 45 degrees.
 - [C] 90 degrees.
 - [D] 100 degrees.

Apakah arah daya garisan magnetik dalam perhubungan dengan arah arus?

- [A] 25 darjah.*
- [B] 45 darjah.*
- [C] 90 darjah.*
- [D] 100 darjah.*

20. Which of the following produce a circular magnetic field?
- [A] Contour probe.
 - [B] Coil.
 - [C] Prodes.
 - [D] All of the above.

Yang mana daripada berikut menghasilkan medan magnetik membulat?

- [A] Penduga kontur.*
- [B] Gegelung.*
- [C] Kuar-kuar.*
- [D] Semua di atas.*

21. Resolution ultrasonic generally increases:
- [A] With increased depth of a defect.
 - [B] With a decrease in the transducer frequency.
 - [C] When the transducer diameter is reduced.
 - [D] With an increase in transducer frequency.

Resolusi ultrasonik biasanya meningkat:

- [A] dengan peningkatan kedalaman kecacatan.*
- [B] dengan penurunan frekuensi transduser.*
- [C] apabila diameter transduser menurun.*
- [D] dengan peningkatan frekuensi transduser.*

22. Longitudinal waves are also called:
- [A] Surface waves.
 - [B] Pressure waves.
 - [C] Compressional waves.
 - [D] Both B and C are correct.

Gelombang longitudinal juga dikenali sebagai:

- [A] *gelombang permukaan.*
- [B] *gelombang tekanan.*
- [C] *gelombang pemampatan.*
- [D] *kedua-dua B and C adalah betul.*

23. Which of the following would make a good couplant?
- [A] Water.
 - [B] Oil.
 - [C] Glycerin.
 - [D] All of the above.

Diantara berikut yang mana merupakan kooplan yang baik?

- [A] *Air.*
- [B] *Minyak.*
- [C] *Gliserin.*
- [D] *Semua di atas.*

24. The total resistance that the cable presents to the electrical current passing through it is called:
- [A] Attenuation.
 - [B] Impedance.
 - [C] Shielding.
 - [D] Resistance.

Jumlah kerintangan yang hadir oleh arus elektrik melalui kabel dipanggil:

- [A] Atunasi.*
- [B] Impedan.*
- [C] Pelindungan.*
- [D] Perintang.*

25. Beam spread is greater when using:
- [A] High frequency transducers.
 - [B] Low frequency transducers.
 - [C] Angle beam transducers.
 - [D] Larger diameter transducers.

Pancaran alur akan besar bila menggunakan:

- [A] Transduser yang mempunyai frekuensi tinggi.*
- [B] Transduser yang mempunyai frekuensi rendah.*
- [C] Sudut alur transduser.*
- [D] Transduser berdiameter besar.*

26. What is the material called that is used to improve the transmission of ultrasonic sound energy from the transducer into the part?
- [A] Gel.
 - [B] Goo.
 - [C] Couplant.
 - [D] Contact paste.

Apakah nama bahan dalam transduser yang digunakan untuk meningkatkan pancaran tenaga bunyi ultrasonik ke bahagian tertentu?

- [A] Gel.*
- [B] Goo.*
- [C] Kouplan.*
- [D] Pekatan sesentuh.*

27. When a longitudinal wave encounters an interface between two material with different acoustic impedances, what occurs when the angle of incidence is 90 degrees?
- [A] Reflection.
 - [B] Refraction.
 - [C] Mode conversion.
 - [D] Reflection and refraction.

Bila gelombang longitudinal melalui antaramuka antara dua bahan dengan impedan akustik yang berbeza, apakah yang terjadi bila sudut tuju ialah 90 darjah?

- [A] Pantulan.*
- [B] Pembiasan.*
- [C] Penukaran mod.*
- [D] Pantulan dan pembiasan.*

28. The sound energy or ultrasonic beam is more uniform in the:
- [A] Far field zone.
 - [B] Near field zone.
 - [C] Interface between the transducer and plastic wedge.
 - [D] Band along the central axis.

Tenaga bunyi atau pancaran ultrasonik makin sepadu dalam:

- [A] *Zon kawasan jauh.*
- [B] *Zon kawasan dekat.*
- [C] *Antaramuka antara transduser dan baji plastik.*
- [D] *Gelung sepanjang paksi tengah.*

29. A decibel is:
- [A] A unit of measure used only for sound measurements.
 - [B] A logarithmic unit that describes a ratio of two measurements.
 - [C] A logarithmic unit that describes the product of two measurements.
 - [D] None of the above.

Desibel ialah:

- [A] *Unit pengukuran digunakan hanya untuk pengukuran bunyi.*
- [B] *Unit logaritma yang digunakan untuk menerangkan pecahan dua pengukuran.*
- [C] *Unit logaritma yang digunakan untuk menerangkan hasilan dua pengukuran.*
- [D] *Tiada satu pun di atas.*

From 31 to 50, State whether the following statements true or false.

Daripada 31 hingga 50, nyatakan samada kenyataan berikut adalah BENAR ataupun SALAH.

31. The investigator dose not care to record pertinent features on failed parts.

Pemeriksa tidak mengambil peduli perhubungkaitan rekod sifat bahagian-bahagian yang gagal.

32. It is recommended to re-mate the fracture surfaces to see if they fit together.

Adalah disyorkan untuk memadan-semula permukaan patah untuk melihat jika ianya sama sepadan.

33. A common procedure is to spray the fracture surface with a clear enamel or acrylic to create artifacts that would confuse or inhibit fracture interpretation.

Suatu procedur biasa untuk menyembur permukaan patah dengan enamel jernih ataupun akrilik untuk menghasilkan artifak yang boleh keliru ataupun merencat intepretasi patah.

34. Moisture created from the cleaning process or humidity can greatly effect the ability of the penetrant to float onto the surface of the part and produce capillary action.

Lembapan yang terjadi daripada proses pencucian ataupun humiditi boleh memberi kesan yang besar terhadap kebolehan bahan penusuk untuk terapung dipermukaan bahagian dan menghasilkan tindakan kapilari.

35. Cleaning a part is performed in order to remove any contaminants that may compromise the inspection process.

Pembersihan bahagian dilaksanakan dalam usaha untuk mengeluarkan mana-mana bahan cemar yang boleh menjejaskan proses pemeriksaan.

36. Inorganic contaminants are materials such as rust, dirt, mineral deposits, plastic, and salt.

Bahan cemar tak-organik adalah bahan seperti karat, kotoran, enapan mineral, plastik dan garam.

37. Alkaline cleaners are detergents that remove certain types of organic contaminants. These include most oil based contaminants.

Pembersih-pembersih alkali adalah pembersih yang mengeluarkan jenis-jenis korus bahan cemar organik. Ini termasuklah kebanyakan bahan cemar berasaskan minyak.

38. It's important that the cleaning process should slightly etch the part under investigation.

Adalah penting proses pencucian sepatutnya memutar sedikit bahagian yang hendak diperiksa.

39. The minimum penetrant dwell time is based on the established procedures.

Masa enap minimum bahan penusuk adalah berdasarkan kepada prosedur-prosedur yang ditetapkan.

40. If the part under inspection is too large for the penetrant tank, the spraying method can be used.

Sekiranya bahagian untuk pemeriksaan adalah terlalu besar untuk tangki bahan penusuk, kaedah penyemburan boleh digunakan.

41. Some transducers are specifically fabricated to be better transmitters and better receivers.

Sesetengah transduser adalah direka khas untuk menghasilkan pancaran dan penerimaan yang baik.

42. Pulse echo is the type of set-up can provide information about both the size of the flaw and distance between the flaw and the transducer.

Gema denyut adalah dibuat untuk menghasilkan maklumat berkenaan saiz kecacatan dan jarak antara kecacatan dan transduser.

43. Resin is used to support the active element and dampen the transducers characteristics.

Resin digunakan untuk menyokong elemen aktif dan melembabkan sifat-sifat transduser.

44. In angle-beam testing, when the geometry of the part is relatively uncomplicated and the orientation of a flaw is well known, the length of a crack can be determined by immersion technique.

Dalam pengujian sudut-alur, bila geometri sesuatu bahagian secara relatif tidak kompleks dan orientasi kecacatan adalah mudah diketahuai, panjang kecacatan boleh diukur dengan menggunakan teknik perendaman.

45. Surface or Rayleigh waves travelling along the surface of relative thick solid material, penetrate to a depth of approximately one wavelength.

Gelombang permukaan atau Rayleigh bergerak secara relatif sepanjang permukaan bahan pepejal tebal, menerobus kedalam lebih kurang satu panjang gelombang.

46. Less damped transducers will exhibit a narrow frequency range.

Transduser lembapan pendek akan menunjukkan julat frekuensi yang sempit.

47. Snell's Law describes the relationship between the sound velocity and the refracted angle of the wave

Hukum Snell menerangkan perhubungan antara halaju bunyi dan sudut biasan gelombang.

48. Transducer is the part of the ultrasonic machine generates short, large amplitude pulses of controlled energy.

Transduser ialah bahagian mesin yang menghasilkan denyut amplitud pendek, besar yang dikawal oleh tenaga.

49. The purpose of the backing material in a transducer is to control the ringing of the active element.

Peranan bahan latarbelakang dalam transduser ialah untuk mengawal getaran bahan aktif.

50. The terms used to describe a technique's ability to locate flaws are Sensitivity and resolution.

Terma-terma yang digunakan untuk menerangkan teknik-teknik kebolehan mengenal pasti kecacatan ialah kesensitifan dan resolusi.

(40 marks/markah)

PART B.
BAHAGIAN B.

1. [a] Cleaning process is very important in visual inspection investigation. State and explain types of cleaner and their operation in visual inspection.
Proses pencucian adalah amat penting dalam penyiasatan pemeriksaan visual.

Nyatakan dan terangkan jenis-jenis pencuci dan pengoperasiannya dalam pemeriksaan visual.

(70 marks/markah)

- [b] Why plugging and masking being used in visual inspection?

Kenapakah pasakkan dan penopengan digunakan dalam pemeriksaan visual?

(30 marks/markah)

2. [a] Explain the steps required in liquid penetrant testing (LPT). What is the effect of component/part geometry on dwell time?

Terangkan langkah-langkah yang diperlukan dalam pengujian cecair penusukan (LPT). Apakah kesan geometri komponen ke atas masa enapan?

(60 marks/markah)

- [b] List down and discuss about different type of developer used in Liquid Penetrant Testing. Give their advantages and disadvantages.

Senarai dan bincangkan berkenaan beberapa jenis developer yang digunakan dalam Pengujian Cecair Penusukan. Berikan kelebihan dan keburukannya.

(40 marks/markah)

3. [a] Explain the concept of Magnetic Particle Inspection (MPI) and where applicable your description must be accompany with appropriate sketches.

Terangkan konsep Pemeriksaan Partikel Magnetik (PPM) dan di mana berpatutan penerangan anda hendaklah berserta dengan lakaran yang bersesuaian.

(60 marks/markah)

- [b] Explain two types of methods for magnetism induction for MPI.

Terangkan dua jenis kaedah pengaruhan pemagnetan bagi PPM.

(40 marks/markah)

4. [a] Explain with appropriate sketches the normal beam inspection.

Terang dengan menggunakan lakaran sesuai tentang pemeriksaan sinar biasa?

(70 marks/markah)

- [b] Calculate the curvature of lens of radius for the sample given in Table 1. The focal length used in this testing is 3.0 cm.

Kirakan jejari lekung kanta bagi sampel yang diberikan dalam Jadual 1. Jarak fokus yang digunakan dalam pemeriksaan ini ialah 3.0 cm.

Table 1 / Jadual 1		
Material / bahan	Velocity / Halaju (cm/ μ s)	
	Longitudinal / Longitudinal	Shear / Ricih
Plexiglass	0.267	0.112
Water / air	0.149	-

(30 marks/markah)

...24/-

5. [a] List the laboratory and field testing informations that are need in any failure analysis procedure.

Senaraikan maklumat-maklumat makmal dan lapangan yang diperlukan dalam mana-mana prosedur analisis kegagalan.

(50 marks/markah)

- [b] Explain with full detail the Pipeline Failure Investigation Procedures

Terangkan dengan terperinci bagi Prosedur penyiasatan kegagalan Penghantaran Paip.

(50 marks/markah)

6. [a] Explain in full detail the eddy current theory?

Terangkan dengan terperinci berkenaan teori arus pusar?

(50 marks/markah)

- [b] Aluminum tube having 30mm outer diameter and 26mm inner diameter was inspected using eddy current encircling coil of 0.9 filling ratio at frequency test ratio of $f/f_g = 10$.

(i) What is the actual frequency of test coil?

(ii) What is the eddy current depth of penetration.

Given: Resistivity for Aluminum = 2.9×10^{-8} ohm-m, susceptibility

$(X_m) = 2.07 \times 10^{-5}$ and $\mu_0 = 4\pi \times 10^{-7}$ H/m

Tiub aluminium mempunyai diameter luar 30mm dan diameter dalam 26mm diperiksa dengan menggunakan arus pusar bergegelung dengan nisbah pengisi 0.9 pada frekuensi ujian $f/f_g = 10$.

(i) *Apakah frekuensi sebenar bagi gegelung ujian?*

(ii) *Apakah kedalaman arus pusar bagu penusukan.*

Given: Resistiviti bagi Aluminium = 2.9×10^{-8} ohm-m, kebolehtelapan

$(X_m) = 2.07 \times 10^{-5}$ dan $\mu_0 = 4\pi \times 10^{-7}$ H/m.

(50 marks/markah)

7. [a] In radiography test there are three basic ways to lower your accumulated radiation dose rate when working with radiographic sources, state and define them?

Dalam pengujian radiography terdapat tiga cara asas untuk menurunkan kadar dos radiasi terkumpul apabila berkerja dengan punca radiasi, nyatakan dan tarikannya?

(50 marks/markah)

- [b] Compare the value of penetrometer sensitivity (EPS) for two cases where been asked to observe the hole with diameter of 0.032 in on shim thickness of 0.005 in and the second case where the hole diameter is 0.023in on the shim thickness of 0.015 in using test object of thickness of 2 in.

Bandingkan nilai bagi kejituan penetrometer (EPS) untuk dua kes di mana diperlukan untuk melihat lubang dengan diameter 0.032 inci di atas kepipis berketebalan 0.005 inci dan kes kedua adalah dimana diameter lubang adalah berdiameter 0.023 inci di atas kepipis berketebalan 0.015 inci menggunakan objek ujian dengan ketebalan 2 inci.

(50 marks/markah)

UNIVERSITI SAINS MALAYSIA
PEPERIKSAAN SEMESTER PERTAMA, SIDANG AKADEMIK 2007/2008

EBB 405E/3 – UJIAN KEGAGALAN TAK MUSNAH

ANSWER SHEET FOR PART A / KERTAS JAWAPAN BAHAGIAN A
(Attention: Attach to your answer booklet)

OBJECTIVE ANSWERS (JAWAPAN OBJEKTIF)

NAMA :

NO. ANGKA GILIRAN:

Hitamkan jawapan yang betul dengan menggunakan pensel yang sesuai.

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

UNIVERSITI SAINS MALAYSIA
PEPERIKSAAN SEMESTER PERTAMA, SIDANG AKADEMIK 2007/2008

EBB 405E/3 – UJIAN KEGAGALAN TAK MUSNAH

ANSWER SHEET FOR PART A / *KERTAS JAWAPAN BAHAGIAN A*
(Attention: Attach to your answer booklet)

TRUE / FALSE ANSWER (*JAWAPAN BENAR / SALAH*)

NAMA :

NO. ANGKA GILIRAN:

Hitamkan jawapan yang betul dengan menggunakan pensel yang sesuai.

- | | | | | | |
|-----|------|-------|-----|------|-------|
| 31. | TRUE | FALSE | 42. | TRUE | FALSE |
| 32. | TRUE | FALSE | 43. | TRUE | FALSE |
| 33. | TRUE | FALSE | 44. | TRUE | FALSE |
| 34. | TRUE | FALSE | 45. | TRUE | FALSE |
| 35. | TRUE | FALSE | 46. | TRUE | FALSE |
| 36. | TRUE | FALSE | 47. | TRUE | FALSE |
| 37. | TRUE | FALSE | 48. | TRUE | FALSE |
| 38. | TRUE | FALSE | 49. | TRUE | FALSE |
| 39. | TRUE | FALSE | 50. | TRUE | FALSE |
| 40. | TRUE | FALSE | | | |
| 41. | TRUE | FALSE | | | |