# UNIVERSITI TUN HUSSEIN ONN MALAYSIA

# FINAL EXAMINATION
## SEMESTER I
## SESSION 2012/2013

| | | |
|---|---|---|
| COURSE NAME | : | SUSTAINABLE CONSTRUCTION MANAGEMENT |
| COURSE CODE | : | BFC32703/BFC3163 |
| PROGRAM | : | 3 BFF |
| EXAMINATION DATE | : | DECEMBER 2012 / JANUARY 2013 |
| DURATION | : | 3 HOURS |
| INSTRUCTION | : | 1. ANSWER **ALL** THE QUESTIONS |
| | | 2. ATTACH **APPENDIX 1** WITH YOUR ANSWER BOOKLET |

THIS QUESTION PAPER CONSISTS OF TEN (10) PAGES

**Q1**　(a)　Sustainable construction may be defined as constructing a healthy built environment based on resource efficiency and ecological design. There are seven principles of sustainable construction. List out all **seven (7)** Principles of Sustainable Construction

(7 marks)

(b)　Recently, everyone involves in built construction is aware of the term 'green building' as green buildings have many benefits. Green Building Index (GBI) is the green rating tool used in Malaysia for buildings to promote sustainability in the built environment and raise awareness among Developers, Architects, Engineers, Planners, Designers, Contractors and the Public about environmental issues and our responsibility to the future generations. Buildings will be awarded the GBI Malaysia rating based on several criteria.

(i)　State all **six (6)** GBI assessment criteria for buildings to be certified as being environmental friendly.

(6 marks)

(ii)　Explain briefly **two (2)** examples for each of the **six (6)** GBI assessment criteria that can be carried out or done to achieve points.

(12 marks)

**Q2**　Engineering organization is a collection of people working together in a coordinated and structured manner in order to achieve engineering goals.

(a)　List **five (5)** factors in considering suitable type of organizational structure.

(5 marks)

(b)　Explain **three (3)** activities involve in each engineering management function as stated below:

(i)　Motivating
(ii)　Staffing
(iii)　Planning
(iv)　Organizing

(12 marks)

(c)　Project manager is one of the important person in construction project. Explain **four (4)** important skills required by project manager in order to manage construction project.

(8 marks)

2

**Q3**   **Table Q3** below show the thirteen (13) work elements including duration and its preceding activities for Activity on Node Diagram.

Table Q3: Project scheduling elements

| Work element | Duration | Immediate Precedence |
|:---:|:---:|:---:|
| 1 | 8 | — |
| 2 | 3 | 1 |
| 3 | 3 | 1 |
| 4 | 3 | 1 |
| 5 | 6 | 2 |
| 6 | 7 | 4 |
| 7 | 5 | 3, 5, 6, |
| 8 | 3 | 7 |
| 9 | 2 | 7 |
| 10 | 5 | 7 |
| 11 | 8 | 8 |
| 12 | 5 | 10 |
| 13 | 10 | 9, 11, 12 |

(a)   Reffering to the diagram in **Figure Q3 (a)** and by using the data in **Table Q3**, complete the Activity on Node Diagram by inserting the arrow, works element and duration for each node.

(10 marks)

(b)   Using the same diagram as in **Figure Q3 (a)** compute the Early Start (ES), Late Start (LS), Early Finish (EF), Late Finish (LF) and Total Float (TF). Then highlight the critical activities on the same diagram.

(7 marks)

(c)   Draw the bar chart for the network diagram in **Figure Q3 (a)** and show the critical path activity.

(8 marks)

**Q4**    (a)    **Table Q4 (a)** below show the tabulated durations of all **five (5)** critical path activities from a CPM network for a project. Based on data given in **Table Q4 (a)** and **Figure Q4 (a)**, compute the following seven values:

**Table Q4 (a):** Tabulated project duration

| | Duration (days) | | |
|---|---|---|---|
| Activity | Optimistic $(T_o)$ | Most Likely $(T_m)$ | Pessimistic $(T_p)$ |
| A | 4 | 7 | 9 |
| B | 6 | 8 | 14 |
| C | 4 | 7 | 8 |
| D | 5 | 3 | 6 |
| E | 5 | 10 | 21 |

     (i)     The probability that the project will finish by the end of day 37.

                                         (2 marks)

     (ii)    The probability that the project will finish by the end day 39.

                                           (2 marks)

     (iii)   The probability that the project will finish before day 35.

                                           (2 marks)

     (iv)   The probability that the project will finish no later than day 40

                                           (2 marks)

     (v)    The probability that project will finish at least two days early.

                                           (2 marks)

     (vi)   The probability that the project will finish at least two days late.

                                           (2 marks)

     (vii)   The completion date with at least a 80% confidence level.

                                           (2 marks)

   (b)    PERT calculation basically requires three types of durations, Optimistic Duration, Most Likely Duration and Pessimistic Duration $(T_o, T_m$ and $T_p)$ to constitutes the practical range of the duration for each activity. Based on the above statement, differentiate three types of the above term by giving meaning and example for each of them.

                                           (6 marks)

   (c)    Based on your understanding describes **five (5)** risks identification as discussed in Risk Management Program. Each of your answer should have an example.

                                           (5 marks)

**TERJEMAHAN BAHASA MELAYSIA**

S1 (a) Pembinaan lestari boleh didefinisikan sebagai sebuah pembinaan ke arah membina alambina yang sihat dan selamat melalui rekaan ekologi dan sumber yang efisien. Terdapat tujuh prinsip-prinsip pembinaan lestari. Senaraikan kesemua **tujuh (7)** prinsip-prinsip pembinaan lestari tersebut.

(7 marks)

(b) Kebelakangann ini, semua yang terlibat di bidang pembinaan sedar tentang terminologi 'bangunan hijau' kerana bangunan hijau mempunyai banyak kebaikan. Indeks Bangunan Hijau atau *'Green Building Index'* (GBI) adalah alat pengukuran hijau yang digunakan di Malaysia untuk bangunan-bangunan mempromosikan lestari di alambina sekaligus meningkatkan kesedaran pada pemaju, arkitek, jurutera, perancang, kontraktor dan juga orang awam tentang isu-isu alam sekitar dan peranan terhadap generasi masa hadapan. Bangunan akan dianugerahkan pengukuran GBI Malaysia berpandukan beberapa kriteria kunci.

(i) Nyatakan kesemua **enam (6)** kriteria penilaian GBI untuk bangunan bagi dinobatkan sebagai mesra alam

(6 marks)

(ii) Terangkan **dua (2)** contoh bagi setiap **enam (6)** kriteria penilaian GBI yang boleh dijalankan untuk mencapai mata kiraan.

(12 marks)

S2 Sekumpulan pekerja yang berkerja bersama secara koordinasi dan berstruktur untuk mencapai matlamat dalam kejuruteraan dikenali sebagai organisasi kejuruteraan.

(a) Senaraikan **lima (5)** faktor yang perlu dipertimbangkan bagi memilih struktur organisasi yang sesuai.

(5 markah)

(b) Jelaskan **tiga (3)** aktiviti yang terlibat dalam setiap fungsi pengurusan kejuruteraan seperti yang telah dinyatakan di bawah:

(i) Motivasi *(motivating)*
(ii) Staf *(Staffing)*
(iii) Perancangan *(Planning)*
(iv) Penyusunan organisasi *(Organizing)*

(12 markah)

(c) Pengurus projek adalah salah satu pihak penting dalam projek pembinaan. Jelaskan **empat (4)** kemahiran yang diperlukan oleh seorang pengurus projek untuk menguruskan projek pembinaan dan bincangkan **satu (1)** daripadanya.

(8 markah)

S3 **Jadual S3** di bawah menunjukkan tigabelas (13) elemen kerja termasuklah tempoh dan aktiviti sebelumnya untuk Rajah Aktiviti pada Nod.

**Jadual S3**: Elemen penjadualan projek

| Elemen Kerja | Tempoh | Aktiviti Sebelum |
|:---:|:---:|:---:|
| 1 | 8 | — |
| 2 | 3 | 1 |
| 3 | 3 | 1 |
| 4 | 3 | 1 |
| 5 | 6 | 2 |
| 6 | 7 | 4 |
| 7 | 5 | 3, 5, 6, |
| 8 | 3 | 7 |
| 9 | 2 | 7 |
| 10 | 5 | 7 |
| 11 | 8 | 8 |
| 12 | 5 | 10 |
| 13 | 10 | 9, 11, 12 |

(a) Merujuk kepada gambarajah dalam **Rajah S3 (a)** dan dengan menggunakan data dalam **Jadual S3**, lengkapkan Rajah Aktiviti pada Nod dengan memasukkan anak panah, elemen kerja dan tempoh untuk setiap nod.

(10 markah)

(b) Menggunakan gambarajah yang sama seperti dalam **Rajah S3 (a)** kira *Early Start* (ES), *Late Start* (LS), *Early Finish* (EF), *Late Finish* (LF) dan *Total Float* (TF). Kemudian tunjukkan aktiviti kritikal pada rajah yang tersebut.

(7 markah)

(c)      Lukiskan carta bar bagi rajah rangkaian dalam **Rajah S3 (a)** dan tunjukkan laluan aktiviti yang kritikal.

(3 markah)

S4     (a)     **Jadual S4 (a)** di bawah menunjukkan jangkamasa untuk kesemua **lima (5)** aktiviti kritikal dari sebuah rangkaian CPM. Berdasarkan maklumat yang diberikan dalam **Jadual S4 (a)** dan **Rajah S4 (a)**, hitungkan tujuh nilai yang berikut:

**Jadual S4 (a)**: Tempoh projek yang dijadualkan

| Aktiviti | Tempoh (hari) | | |
| --- | --- | --- | --- |
| | Optimistik $(T_o)$ | Lazim $(T_m)$ | Pesimistik $(T_p)$ |
| A | 4 | 7 | 9 |
| B | 6 | 8 | 14 |
| C | 4 | 7 | 8 |
| D | 5 | 3 | 6 |
| E | 5 | 10 | 21 |

(i)     Kebarangkalian projek akan dapat disiapkan pada hujung hari yang ke-37.

(2 markah)

(ii)     Kebarangkalian projek akan siap pada hujung hari yang ke-39.

(2 markah)

(iii)     Kebarangkalian projek akan siap sebelum hari ke-35.

(2 markah)

(iv)     Kebarangkalian projek akan disiapkan tidak lewat dari hari ke-40.

(2 markah)

(v)     Kebarangkalian projek akan siap 2 hari lebih awal.

(2 markah)

(vi)     Kebarangkalian projek akan siap 2 hari lebih lewat.

(2 markah)

(vii)     Tarikh siap dengan sekurang-kurangnya 80 % tahap keyakinan.

(2 markah)

(b)    Secara asasnya pengiraan PERT memerlukan **tiga (3)** jenis jangka masa Jangkamasa Optimistik, Jangkamasa Lazim dan Jangkamasa Pesimistik ($T_o$, $T_m$ dan $T_p$ ) untuk membentuk jangka masa yang praktikal bagi setiap aktivitinya. Berdasarkan penyataan di atas, bezakan ketiga-tiga jenis jangkamasa tersebut dengan memberi pengertian dan contoh bagi setiap satunya.

(6 markah)

(c)    Berdasarkan pemahaman anda terangkan **lima (5)** pengenalan risiko seperti yang dibincangkan dalam Program Pengurusan Risiko. Setiap jawapan anda harus mempunyai satu contoh.

(5 marks)

# FINAL EXAMINATION

SEMESTER / SESSION  : SEM I / 2012/2013

COURSE           : SUSTAINABLE CONSTRUCTION
                    MANAGEMENT
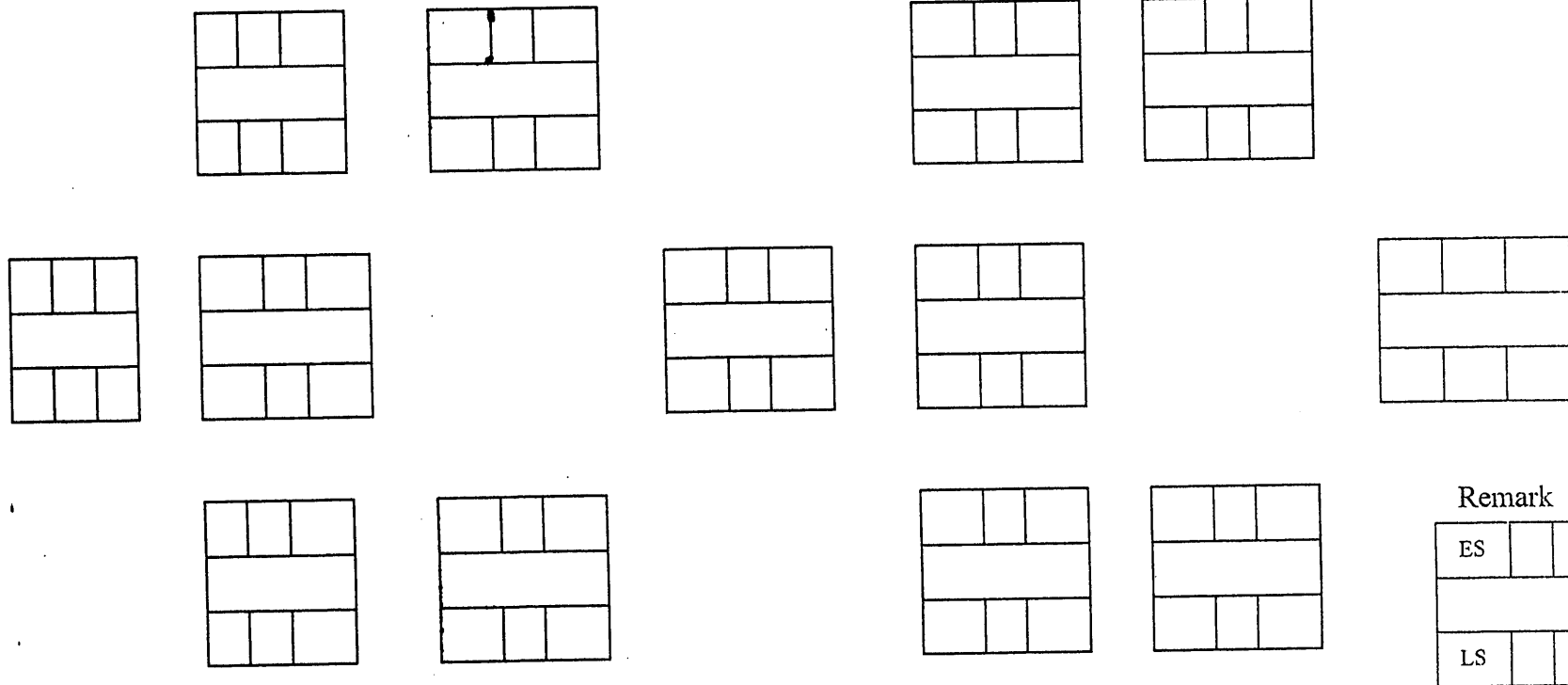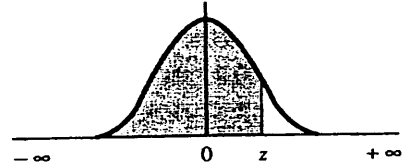
PROGRAMME    : 3 BFF

COURSE CODE   : BFC 32703/BFC3163

Remark

| ES | | EF |
|----|----|----|
| | | |
| LS | | LF |

**Figure Q3(a)/Rajah S3 (a)**

# FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 2012/2013     PROGRAMME : 3 BFF
COURSE : PLANNING, SCHEDULING &     COURSE CODE : BFC32703/ BFC3163
    CONSTRUCTION

**CUMULATIVE PROBABILITIES OF
THE NORMAL DISTRIBUTION (AREAS UNDER THE
STANDARDIZED NORMALIZED CURVE FROM $-\infty$ TO $z$)**    $-\infty$     $0$   $z$    $+\infty$

| z | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.5000 | 0.5040 | 0.5080 | 0.5120 | 0.5160 | 0.5199 | 0.5239 | 0.5279 | 0.5319 | 0.5359 |
| 0.1 | 0.5389 | 0.5438 | 0.5478 | 0.5517 | 0.5557 | 0.5596 | 0.5636 | 0.5675 | 0.5714 | 0.5753 |
| 0.2 | 0.5793 | 0.5832 | 0.5871 | 0.5910 | 0.5948 | 0.5987 | 0.6026 | 0.6064 | 0.6103 | 0.6141 |
| 0.3 | 0.6179 | 0.6217 | 0.6255 | 0.6293 | 0.6331 | 0.6368 | 0.6406 | 0.6443 | 0.6480 | 0.6517 |
| 0.4 | 0.6554 | 0.6591 | 0.6628 | 0.6664 | 0.6700 | 0.6736 | 0.6772 | 0.6808 | 0.6844 | 0.6879 |
| 0.5 | 0.6915 | 0.6950 | 0.6985 | 0.7019 | 0.7054 | 0.7088 | 0.7123 | 0.7157 | 0.7190 | 0.7224 |
| 0.6 | 0.7257 | 0.7291 | 0.7324 | 0.7357 | 0.7389 | 0.7422 | 0.7454 | 0.7486 | 0.7517 | 0.7549 |
| 0.7 | 0.7580 | 0.7611 | 0.7642 | 0.7673 | 0.7704 | 0.7734 | 0.7764 | 0.7794 | 0.7823 | 0.7852 |
| 0.8 | 0.7881 | 0.7910 | 0.7939 | 0.7967 | 0.7995 | 0.8023 | 0.8051 | 0.8078 | 0.8106 | 0.8133 |
| 0.9 | 0.8159 | 0.8186 | 0.8212 | 0.8238 | 0.8264 | 0.8289 | 0.8315 | 0.8340 | 0.8365 | 0.8389 |
| 1.0 | 0.8413 | 0.8438 | 0.8461 | 0.8485 | 0.8508 | 0.8531 | 0.8554 | 0.8577 | 0.8599 | 0.8621 |
| 1.1 | 0.8643 | 0.8665 | 0.8686 | 0.8708 | 0.8729 | 0.8749 | 0.8770 | 0.8790 | 0.8810 | 0.8830 |
| 1.2 | 0.8849 | 0.8869 | 0.8888 | 0.8907 | 0.8925 | 0.8944 | 0.8962 | 0.8980 | 0.8997 | 0.9015 |
| 1.3 | 0.9032 | 0.9049 | 0.9066 | 0.9082 | 0.9099 | 0.9115 | 0.9131 | 0.9147 | 0.9162 | 0.9177 |
| 1.4 | 0.9192 | 0.9207 | 0.9222 | 0.9236 | 0.9251 | 0.9265 | 0.9279 | 0.9292 | 0.9306 | 0.9319 |
| 1.5 | 0.9332 | 0.9345 | 0.9357 | 0.9370 | 0.9382 | 0.9394 | 0.9406 | 0.9418 | 0.9429 | 0.9441 |
| 1.6 | 0.9452 | 0.9463 | 0.9474 | 0.9484 | 0.9495 | 0.9505 | 0.9515 | 0.9525 | 0.9535 | 0.9545 |
| 1.7 | 0.9554 | 0.9564 | 0.9573 | 0.9582 | 0.9591 | 0.9599 | 0.9608 | 0.9616 | 0.9625 | 0.9633 |
| 1.8 | 0.9641 | 0.9649 | 0.9656 | 0.9664 | 0.9671 | 0.9678 | 0.9686 | 0.9693 | 0.9699 | 0.9706 |
| 1.9 | 0.9713 | 0.9719 | 0.9726 | 0.9732 | 0.9738 | 0.9744 | 0.9750 | 0.9756 | 0.9761 | 0.9767 |
| 2.0 | 0.9772 | 0.9778 | 0.9783 | 0.9788 | 0.9793 | 0.9798 | 0.9803 | 0.9808 | 0.9812 | 0.9817 |
| 2.1 | 0.9821 | 0.9826 | 0.9830 | 0.9834 | 0.9838 | 0.9842 | 0.9846 | 0.9850 | 0.9854 | 0.9857 |
| 2.2 | 0.9861 | 0.9864 | 0.9868 | 0.9871 | 0.9875 | 0.9878 | 0.9881 | 0.9884 | 0.9887 | 0.9890 |
| 2.3 | 0.9893 | 0.9896 | 0.9898 | 0.9901 | 0.9904 | 0.9906 | 0.9909 | 0.9911 | 0.9913 | 0.9916 |
| 2.4 | 0.9918 | 0.9920 | 0.9922 | 0.9925 | 0.9927 | 0.9929 | 0.9931 | 0.9932 | 0.9934 | 0.9936 |
| 2.5 | 0.9938 | 0.9940 | 0.9941 | 0.9943 | 0.9945 | 0.9946 | 0.9948 | 0.9949 | 0.9951 | 0.9952 |
| 2.6 | 0.9953 | 0.9955 | 0.9956 | 0.9957 | 0.9959 | 0.9960 | 0.9961 | 0.9962 | 0.9963 | 0.9964 |
| 2.7 | 0.9965 | 0.9966 | 0.9967 | 0.9968 | 0.9969 | 0.9970 | 0.9971 | 0.9972 | 0.9973 | 0.9974 |
| 2.8 | 0.9974 | 0.9975 | 0.9976 | 0.9977 | 0.9977 | 0.9978 | 0.9979 | 0.9979 | 0.9980 | 0.9981 |
| 2.9 | 0.9981 | 0.9982 | 0.9982 | 0.9983 | 0.9984 | 0.9984 | 0.9985 | 0.9985 | 0.9986 | 0.9986 |
| 3.0 | 0.9987 | 0.9987 | 0.9987 | 0.9988 | 0.9988 | 0.9989 | 0.9989 | 0.9989 | 0.9990 | 0.9990 |
| 3.1 | 0.9990 | 0.9991 | 0.9991 | 0.9991 | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9993 | 0.9993 |
| 3.2 | 0.9993 | 0.9993 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9995 | 0.9995 | 0.9995 |
| 3.3 | 0.9995 | 0.9995 | 0.9995 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9997 |

**Figure Q4 (a)/Rajah S4 (a)**