CLASS: MTECH   SEMESTER : III
BRANCH: EEE   SESSION : MO/19

SUBJECT: EE631 POWER SYSTEM RELIABILITY EVALUATION

TIME: 3 HOURS   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   Evaluate reliability in terms of mean time to failure.   [5]
Q.1(b)   A hard plastic box designed to house a multi-meter is tested for its impact strength by dropping it   [5]
         from a fixed height and observing for any damage. A total of 500 boxes were tested and the results
         are tabulated as:

No. of drops:	10	12	13	15	17	20	21	23	25
No. of boxes damaged:	30	50	30	110	90	130	17	35	8

Obtain failure density, hazard rate and reliability?

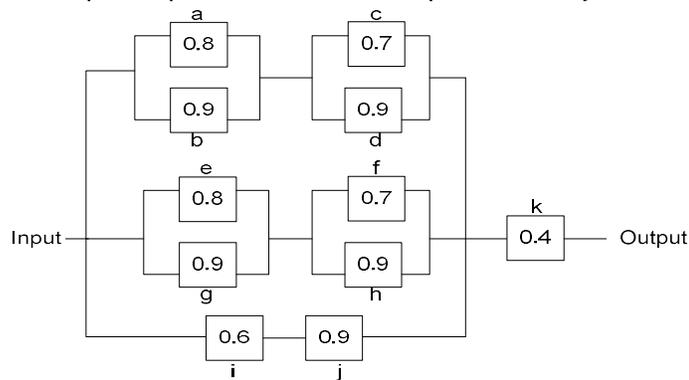Q.2(a)   Evaluate reliability for complex dependent dissimilar components in a system as in Fig.1.   [5]

Fig.1

Q.2(b)   A system consists of three units connected in series, with reliabilities R_1=0.70, R_2=0.80, R_3=0.90. It is   [5]
         desired that the reliability of the system be 0.65. How should this be apportioned among the three
         units? Determine using minimum-effort method and the general method.

Q.3(a)   Design using fault tree a complex system constituting of three redundant generating units feeding a   [5]
         load through two redundant lines to determine its reliability. Also justify using reliability analysis for
         complex independent identical components.
Q.3(b)   Three generating units are operating in parallel: [5]
         2*3 MW unit with FOR-0.02
         1*5 MW unit with FOR-0.03
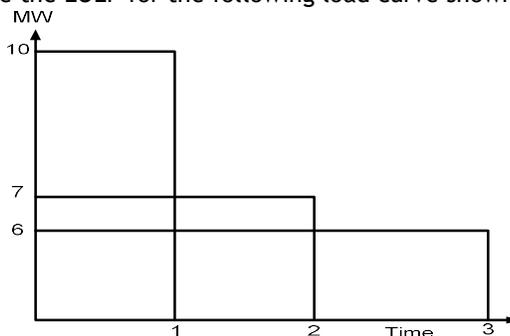   Obtain COPT and determine the LOLP for the following load curve shown in Fig. 2

Fig.2

Q.4(a)   Four generating units are operating in parallel. Design using Markov model to determine the frequency   [5]
and duration of state probabilities.

Q.4(b)   Analyze the different reliability indices for HLI and HL2 of power system network.   [5]

Q.5(a)   Design using Monte Carlo method the reliability analysis for (i) a series system (ii) a parallel system   [5]

Q.5(b)   Differentiate between reliability and resiliency. Interpret the reliability worth indices?   [5]

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