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**University Examinations 2015/2016**

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR THE DIPLOMA IN ELECTRICAL ENGINEERING AND DIPLOMA IN CIVIL ENGINEERING.

**SME 2200: ENGINEERING MATHEMATICS III.**

**DATE: APRIL 2016 TIME:11/ 2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Evaluate the following
2.  (2 marks)
3.  (2 marks)
4. Given the set of values 3, 6, 7, 8, 11 and 13, find the variance and the standard deviation. (4 marks)
5. Fifteen percent of castings are found to be outside prescribed tolerances. Determine the number of acceptable items likely to be present in a batch of 120 such castings. (3 marks)
6. A variable x follows a poisson distribution with mean 6. Given that , calculate:
7. $P(x=0)$ (2 marks)
8. $P(x>2)$ (3 marks)
9. A number is choosen at random from the numbers 1, 2, 3,....,30. Find the probability that it is divisible by four, given that it is divisible by three. (3 marks)
10. A random sample of 12 items is taken and is found to have a mean weight of 50 grams and a standard deviation of 9 grams. What is the mean weight population with
11. 95% confidence (2 marks)
12. 99% confidence (2 marks)
13. The masses of 45 castings were determined as shown in the table below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Mass(kg) | 7.3 | 7.4 | 7.5 | 7.6 | 7.7 | 7.8 | 7.9 |
| frequency | 3 | 6 | 10 | 11 | 7 | 5 | 3 |

Determine the variance. (4 marks)

1. A candidate is selected for interview of management trainees for the three companies. For the first company there are 12 candidates, for the second there are 15 candidates and for the third there are 10 candidates. What are the chances of his getting at least at one of the companies? (3 marks)

**QUESTION TWO (15 MARKS)**

1. A box A contains 6 white and 4 blue plugs while box B contains 5 white and 3 blue plugs. If one plug is drawn from each box, find the probability that
2. Both plugs are white (1 mark)
3. Both plugs are blue (1 mark)
4. One is blue and one is white (3 marks)
5. Calculate the regression equation of x on y and y on x from the data below using least square method. (10 marks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 1 | 2 | 3 | 4 | 5 |
| y | 2 | 5 | 3 | 8 | 7 |

**QUESTION THREE (15 MARKS)**

1. The mean of 80 brass junction gave the following frequency distribution

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Mass(kg) | 4.12-4.16 | 4.17-4.21 | 4.22-4.26 | 4.27-4.31 | 4.32-4.36 |
| frequency | 5 | 12 | 16 | 20 | 4 |

Calculate:

1. The mean (3 marks)
2. The median (3 marks)
3. The standard deviation (4 marks)
4. A machine produces on average 2% defectives. In a random sample of 60 items, determine the probability of there being three defectives. (5 marks)

**QUESTION FOUR (15 MARKS)**

1. A box contains 100 copper plugs of which 27 are oversize and 16 are undersize. A plug is taken, tested but not replaced. A second plug is then treated similarly. Determine the probability that;
2. Both plugs are acceptable (2 marks)
3. The first is oversize and the second undersize. (2 marks)
4. One is oversize and the other undersize (3 marks)
5. In how many ways can a firm manager select 3 female workers out of the available 30 females and 10 male workers out of the available 12 males? (4 marks)
6. A survey conducted to determine the reading habits in a town indicated that 50% of the residents read the morning paper, 60% read the evening paper and 20% read both newspapers. Find the probability that a resident selected reads either the morning or evening or both. (4 marks)

**QUESTION FIVE (15 MARKS)**

1. The mean of binomial distribution is 40 and the standard deviation is 6. Calculate the number of independent events, probability of success and probability of failure. (3 marks)
2. A normal curve has and . Find the area between and . (4 marks)
3. A die is rolled five times. Determine the probability of obtaining three sixes (5 marks)
4. The thickness of 20 samples of steel plate are measured and the results recorded as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Thickness (mm) | 6.2-6.4 | 6.5-6.7 | 6.8-7.0 | 7.1-7.3 | 7.4-7.6 | 7.7-7.9 |
| frequency | 1 | 4 | 6 | 5 | 3 | 1 |

Represent the information using a histogram. (3 marks)