KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2019

Marks scored:

Level : B.E.
Year : II

Course : MEEG 219
Semester : I

Exam. Roll No.:

Time: 30 mins.

F.M. : 20

Registration No.:

Date 07 MAR 2019

SECTION "A"
[20 Q. ×1 = 20 marks]

Choose the most appropriate answer and **mark [X]**.

1. The measurement of a quantity
   [ ] is an act of comparison of an unknown quantity with another quantity.
   [ ] is an act of comparison of an unknown quantity with a known quantity whose accuracy may be known or unknow.
   [ ] is an act of comparison of an unknown quantity with a predefined acceptable standard which is accurately known.
   [ ] is an act of comparison of an known quantity with a primary standard.

2. The ability to reproduce same reading when measured over time is _____.
   [ ] repeatability [ ] precision [ ] reproducibility [ ] accuracy

3. A bar of length 'L' need to be supported at two points. Distance between the supports as per Sir G. B. Airy is given by
   [ ] 0.500L [ ] 0.517L [ ] 0.577L [ ] 0.599L

4. Which of the following errors are inevitable in the measuring system and it would be painful exercise to avoid them
   [ ] systematic errors [ ] random errors
   [ ] calibration errors [ ] environmental errors

5. Standards to be used for reference purposes in laboratories and workshops are referred to as
   [ ] primary standards [ ] secondary standards
   [ ] tertiary standards [ ] working standards

6. The least count of a Vernier caliper having 25 divisions on Vernier scale, matching with 24 main scale divisions (1 main scale division = 0.5 mm) is
   [ ] 0.05 mm [ ] 0.01 mm [ ] 0.001 mm [ ] 0.02 mm

7. Which of the following is not provided on combination set?
   [ ] Center head [ ] Vernier scale [ ] Protractor head [ ] Spirit level

8. V-block is used in the workshop to check
   [ ] roundness of a cylindrical work [ ] surface roughness
   [ ] dimensions of oval job [ ] taper on a job

9. The thread micrometer measures
   [ ] the major diameter of the thread [ ] the minor diameter of the thread
   [ ] the effective diameter of the thread [ ] the root diameter of the thread

10. _____ gear is a gear wheel or pinion for transmitting motion between two parallel shafts.
[ ] Spur [ ] Bevel [ ] Helical [ ] Worm

11. _____ is an instrument desired to measure small angular deflections.
[ ] Clinometer [ ] Auto-collimator
[ ] Sine bar [ ] Bevel protractor

12. Pitch is equal to lead for
[ ] single start thread [ ] double start thread
[ ] triple start thread [ ] all multiple start threads

13. Maximum Material Limit (MML) and Least Material Limit (LML) for a hole respectively corresponds to
[ ] maximum hole limit and minimum hole limit
[ ] maximum shaft limit and minimum shaft limit
[ ] minimum hole limit and maximum hole limit
[ ] average size of the hole limits

14. Which among the following is a type of clearance fit?
[ ] Slide fit [ ] Push fit [ ] Force fit [ ] Tight fit

15. Gauge used to measure small gap between the mating parts is known as
[ ] slip gauge [ ] feeler gauge [ ] gauge block [ ] dial gauge

16. Which of the following thread form is best suitable for power transmission application?
[ ] Square thread [ ] Matric thread [ ] Whitworth thread [ ] Knuckle thread

17. Expressing a dimension as $50^{+0.25}_{-0.10}$ mm is the case of
[ ] limiting dimensions [ ] unilateral tolerance
[ ] universal tolerance [ ] bilateral tolerance

18. _____ gear is used when large gear reduction is required.
[ ] Helix [ ] Rack and pinion [ ] Bevel [ ] Worm

19. Which one of the following error doesn't exist in thread?
[ ] Parallel error [ ] Progressive error [ ] Drunken error [ ] Irregular error

20. The distance measured on the circumference of the pitch circle from a point of one tooth to the corresponding point on the next tooth is
[ ] diametral pitch [ ] circular pitch [ ] pitch surface [ ] module

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07 MAR 2019

Level : B.E.
Year : II
Time : 2 hrs. 30 min.

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Semester : I
F.M. : 55

SECTION "B"

Attempt ALL the questions.

1. What do you mean by the term error in measurement? A resistor labelled as 240 Ω is actually 243.32753 Ω. What are the absolute and relative errors of the labelled value? [1 + 2]

2. Explain Primary, Secondary and Working Standards with an example. [3]

3. State four differences between systematic and random errors. [2]

4. A Vernier calliper has 19 divisions of main scale equal to 20 divisions of Vernier scale. The main scale of a Vernier calliper is calibrated in mm. The same Vernier is used to measuring the diameter of a cylinder. The reading shows 35 main scale divisions and 4th division of vernier scale coincides with a main scale division.
   a. Evaluate the least count. [1.5]
   b. The radius of the cylinder measured. [1.5]

5. Fill in the table taking reference to figure. [3]

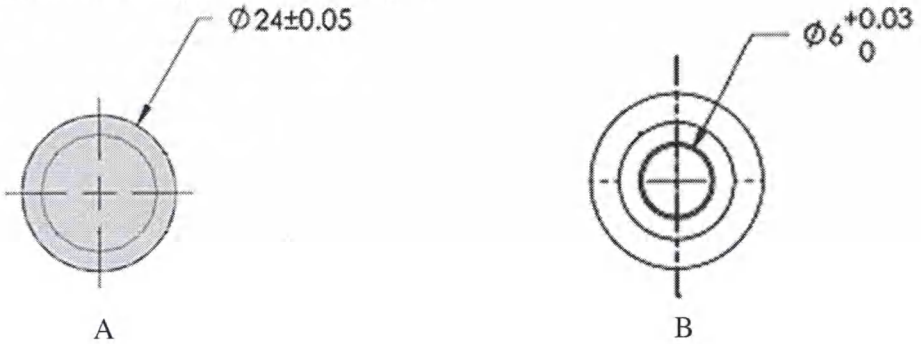

Figure 1

Part	Maximum Material Condition	Least Material Condition	Allowable Tolerance
A			
B			

6. A hole and shaft have a basic size of 25 mm, and are to have a clearance fit with a maximum clearance of 0.02 mm and a minimum clearance of 0.01 mm. The hole tolerance is to be 1.5 times the shaft tolerance. Determine: limit for both hole and shaft
   a. Using a hole basis system. [1.5]
   b. Using a shaft basis system. [1.5]

7. Write short notes on any four: [4 × 1.5 = 6]
   a. Vernier height gauge
   b. Surface plate
   c. Dial indicator
   d. Bevel Protractor
   e. Spirit level
   f. Clinometer

8. State Taylor's principle of gauge design. [3]

9. Explain why it is not preferred to use sine bar for measuring angles more than 45°. [3]

10. A 100 mm sine bar is used to set up an angle of 33°, determine the slip gauge needed from 87 pieces set in Table 1. [3]

Table 1: 87 pieces slip gauge set

(2) Set M 87 (special set)		
Range (mm)	Steps (mm)	No. of blocks
1.001 – 1.009	0.001	9
1.01 – 1.49	0.01	49
0.5 – 9.5	0.5	19
10 – 90	10	9
1.005	—	1

Later it is noticed that the actual angle required is 33° 9' 15". Use 13 pieces angle gauge set (Table 2) to setup actual angle. [2]

Table 2: 13 pieces standard angle gauge set

Degrees	Minutes	Second
1	1	3
3	3	6
9	9	18
27	27	30
41		

11. Perfectly smooth surface is not always required, instead it depends upon specific application of the parts. Explain the statement with suitable examples where rough surfaces are desirable. [3]

12. The measurement of surface roughness heights and depths of 10 successive peaks and valleys over mean line were found to be:

Peaks (μm):	45	42	40	35	35
Valleys (μm):	30	25	25	24	18

Determine *Ra* and *Rt* values of the measured surface. [3]

13. Explain measurement of minor diameter of external thread using micrometer with two V-pieces method. [4]

14. Describe following pitch errors of thread in brief: [2 × 1.5 = 3]
a. Periodic error
b. Drunken error

15. Name the various methods used for measurement of gear tooth thickness and explain any one of them. [3]

16. Define the following terms (any five): [5 × 1 = 5]
a. Depth of thread
b. Flank angle
c. Addendum circle
d. Circular pitch
e. Diametral pitch
f. Waviness