

KATHMANDU UNIVERSITY
End Semester Examination
March/April, 2017

Marks scored: _____

Level : B.E.
Year : III

Course : EPEG 317
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

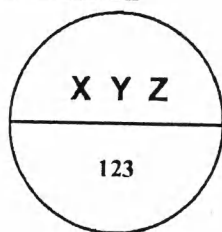
Registration No.:

Date APR 09 2017

SECTION "A"
[20 Q × 1=20 marks]

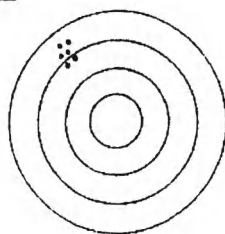
Choose the most appropriate answer.

1. Measuring instruments can be generalized as _____.
[a] all electronic type [b] all mechanical type
[c] mixed analog-digital type [d] electro-mechanical type
2. A single PLC can be programmed to replace number of _____.
[a] transistors [b] relays [c] ADCs [d] DSPs
3. The instrument shown is _____.



- [a] mounted in the field [b] mounted in the control room
[c] not accessible to the operator [d] mounted out of sight

4. System shown is _____.



- [a] accurate and precise [b] not accurate and not precise
[c] not accurate but precise [d] accurate but not precise

5. Zero drift or bias of a measuring instrument is the effect where the zero reading of the instrument is _____.
[a] modified by the ambient conditions [b] unmodified by the ambient conditions
[c] 0 [d] 1

6. The probability that the error lies in a band between error levels D_1 and D_2 can be expressed as _____.

[a] $\int_{D_1}^{D_2} \frac{1}{\sqrt{2\pi}} e^{(D^2/2)} dD$

[b] $\int_{D_1}^{D_2} \frac{1}{\sigma\sqrt{\pi}} e^{(-D^2/2\sigma^2)} dD$

[c] $\int_{D_1}^{D_2} \frac{1}{\sigma\sqrt{2\pi}} e^{(D^2/2\sigma^2)} dD$

[d] $\int_{D_1}^{D_2} \frac{1}{\sigma\sqrt{2\pi}} e^{(-D^2/2\sigma^2)} dD$

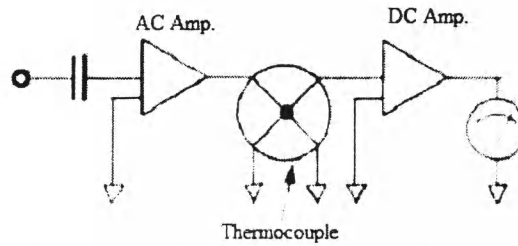
7. In a linear scale moving coil meter, the torque is proportional to the _____.

- [a] flux density [b] number of turns [c] current [d] width of the coil

8. Crest Factor is defined as _____.

- [a] E_{PEAK}/E_{RMS} [b] E_{RMS}/E_{PEAK} [c] $(E_{PEAK}/E_{RMS})^2$ [d] $(E_{RMS}/E_{PEAK})^2$

9. The voltmeter shown below can respond to _____.

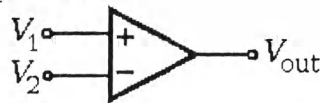


- [a] peak [b] true RMS [c] average [d] true RMS and peak

10. Burden of a current transformer is the _____.

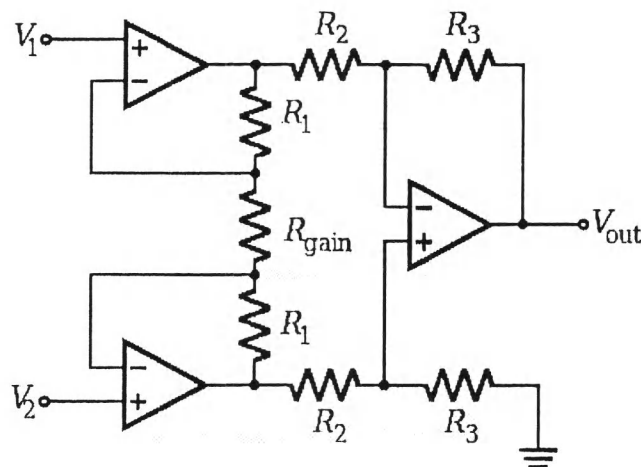
- [a] primary load [b] secondary load [c] primary voltage [d] secondary voltage

11. Circuit shown is _____ bit ADC.



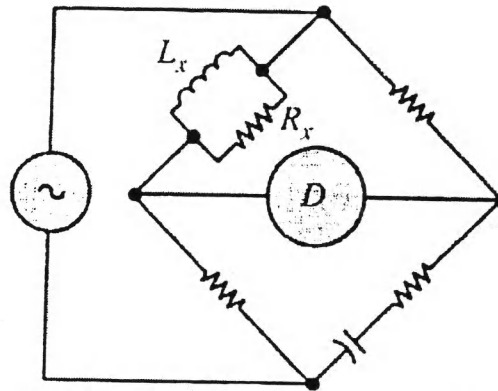
- [a] 0 [b] 1 [c] 2 [d] 3

12. The gain ($V_{OUT}/(V_2-V_1)$) of the circuit with $R_3 = R_2$ and $R_1 = R_{gain}$ is _____.

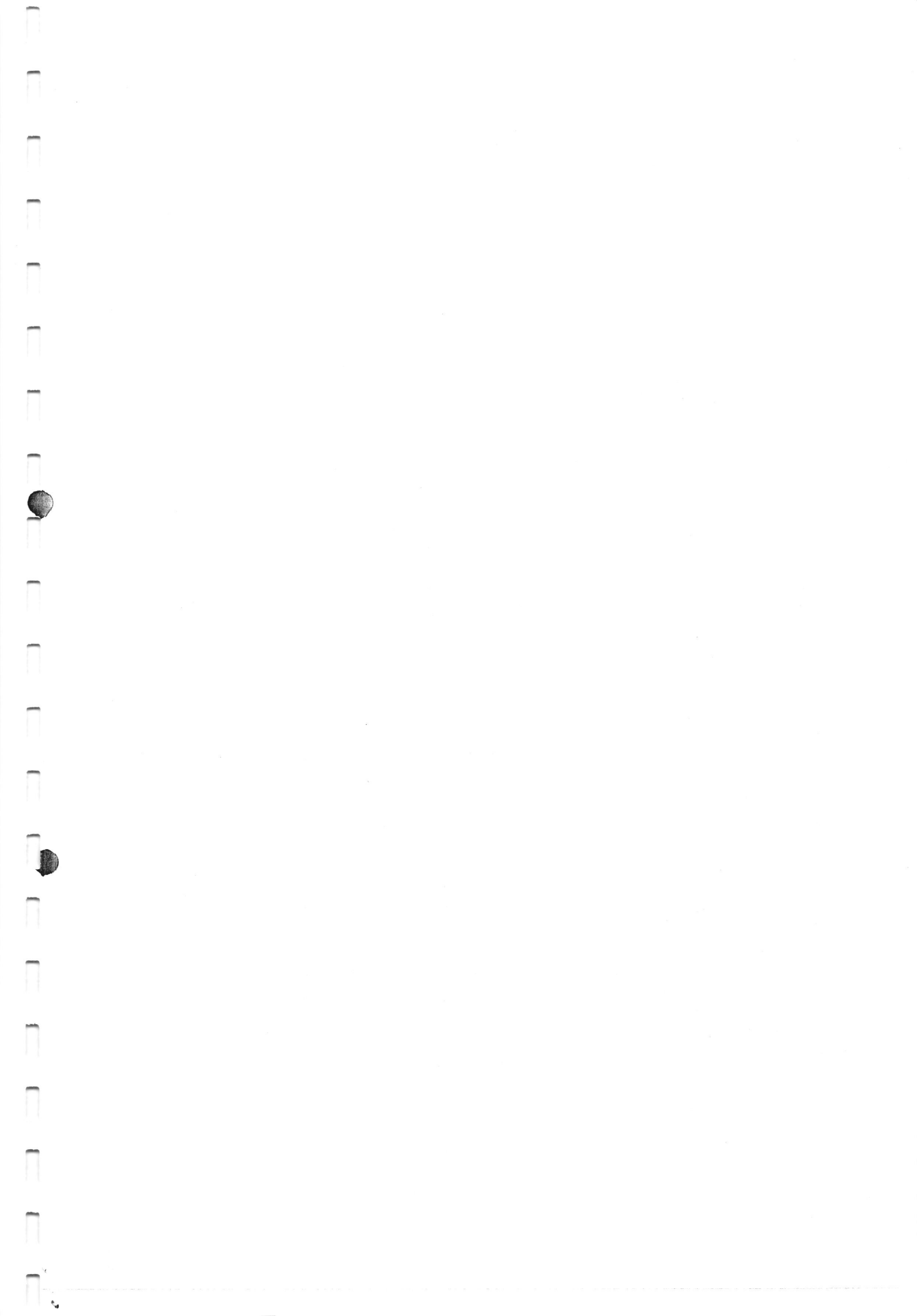


- [a] 1 [b] 2 [c] 3 [d] 4

13. 4 bit ADC with 10 V FS yields an LSB of _____ V
 [a] 0.4 [b] 0.625 [c] 1.6 [d] 2.5
14. Second harmonics of a 4.85 MHz signal will alias at _____ with 10 MHz sampling rate.
 [a] 100 kHz [b] 200 kHz [c] 300 kHz [d] 400 kHz
15. In a DAQ application, sampling rate required to accurately represent the shape of a signal is _____ times the maximum frequency of the signal.
 [a] two [b] three [c] five [d] ten
16. _____ is not a typical component of DAQ system.
 [a] Computer [b] LabVIEW
 [c] Signal conditioning and ADC block [d] Application software
17. Circuit shown in the figure is _____ bridge.



- [a] Wien [b] Wheatstone [c] DC [d] AC
18. _____ has wide temperature range.
 [a] IC Sensor [b] Thermistor [c] Thermocouple [d] RTD
19. The basic theory behind _____ is based on the electrical dipole.
 [a] piezoelectricity [b] accelerometer [c] gyro sensor [d] strain gauge
20. _____ can be best used as a proximity sensor.
 [a] Strain Gauge [b] Thermistor [c] Hall effect sensor [d] Potentiometer



SECTION "B"

[5 Q. × 11 = 55 marks]

Attempt *ANY FIVE* questions. Assume suitable data where necessary.

1. a. Figure 1 shows the stamping machine. Describe the application in a flow chart as a sequence of events. Make sure the events are completed in a specific order. [5]

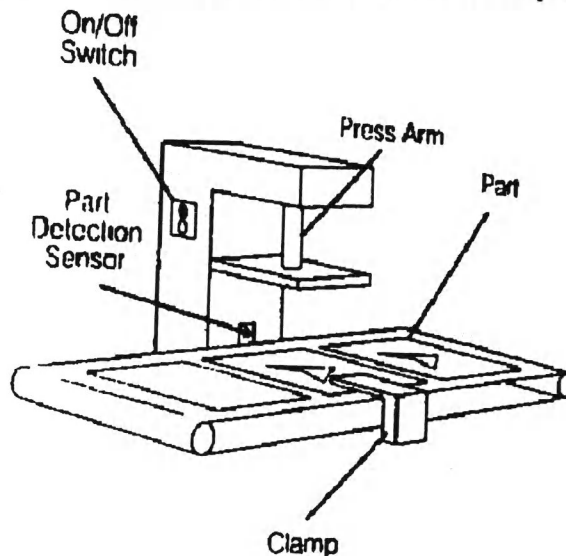


Figure: 1

- b. An integrated circuit chip contains 10^5 transistors. The transistors have mean current gain of 20 and standard deviation of 2. Calculate the following: [3+3]
(i) the number of transistors with a current gain between 19.8 and 20.2.
(ii) the number of transistors with a current gain greater than 17.
Necessary table is provided at the final page.
2. a. With necessary illustrations explain the construction and working principle of moving coil meter. [6]
b. Design a multi range ammeter by using Ayrtton Shunt method to give the following ranges: 10mA, 100mA, 1A, 10A, and 100A. D'Arsonval meter has internal resistance of 10Ω and full scale current of 1mA. [5]
3. a. Explain with necessary circuits; true RMS responding, average responding, and peak responding AC voltmeters. [6]
b. Draw the circuit of operational amplifier based comparator and explain its role in analog signal conditioning. [5]
4. a. Draw circuit of basic sample and hold circuit and explain four modes of operation. [5]

