(3 Hours) **Total Marks: 80**

N.B: (1) Question No. 1 is compulsory.
(2) Attempt any three from the remaining questions.
(3) Figures to the right indicate full marks.
(4) Each question is of 20 Marks

Q.1	Attempt **any 4** questions	**Marks**
A	Draw Speed torque relationship for DC Shunt and Dc Series motor.	**5**
B	Give classification of transducers.	**5**
C	Explain i) Magnetic flux ii) Leakage Flux iii) Magnetic saturation.	**5**
D	Draw Wheatstone bridge and write balancing equation.	**5**
E	Write difference between Resolution & sensitivity of digital meters	**5**

Q.2		**Marks**
A	Derive torque equation of singly excited system.	**10**
B	Explain Basic potentiometer circuit and how it is used for the calibration of ammeter.	**10**

Q.3		**Marks**
A	Explain working principles of any digital Voltmeter.	**10**
B	A 250 V, 4 pole, wave wound dc series motor has 782 conductors on its armature. It has armature and series field resistance of 0.75 ohm. It takes current of 40 A. estimate its speed and gross torque developed if it has flux per pole of 25 m wb.	**10**

Q.4		**Marks**
A	Draw and explain Kelvin's Double bridge.	**10**
B	Draw and explain Hall effect and optical transducer with example.	**10**

Q.5		**Marks**
A	Explain working principle of digital Tachometer.	**10**
B	Explain in brief the principle of electro-mechanical energy conversion and develop a model of electro-mechanical energy conversion device.	**10**

Q.6		**Marks**
A	Write a short note on: Swinburne's test on DC Machine	**10**
B	Write a short note on: Energy and co energy stored in magnetic field.	**10**

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